A DOUBLE BLIND RANDOMIZED CONTROL STUDY COMPARING THE EFFICACY OF 0.25% ISOBARIC BUPIVACAINE TO 0.5% HYPERBARIC BUPIVACAINE DURING SPINAL ANAESTHESIA FOR LOWER LIMB SURGERY IN ASA II AND ASA III PATIENTS

A DISSERTATION SUBMITTED IN PART FULFILLMENT OF THE REQUIREMENT OF THE Dr. M G R MEDICAL UNIVERSITY, CHENNAI, FOR M.D (Anesthesiology) APRIL 2011

By

Vasudha.B.Rao

CERTIFICATE

This is to certify that the work carried out in this thesis entitled 'A DOUBLE BLIND RANDOMIZED CONTROL STUDY COMPARING THE EFFICACY OF 0.25% ISOBARIC BUPIVACAINE TO 0.5% HYPERBARIC BUPIVACAINE DURING SPINAL ANAESTHESIA FOR LOWER LIMB SURGERY IN ASA II AND ASA III PATIENTS' was carried out by Dr.Vasudha.B.Rao in the department of Anaesthesia, Christian Medical college, Vellore under my supervision and guidance.

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I am also grateful to the patients who participated in this study.

Most importantly, I am grateful to GOD for his blessing, in completing this study.

CONTENTS

AIMS AND OBJECTIVES…

Aims and Objectives:

To compare the efficacy of two solutions of bupivacaine, 1.5ml of 0.5% bupivacaine and 3 ml of 0.25% hyperbaric bupivacaine in providing stable hemodynamics.

To compare the time of onset, height of block, intensity of sensory and motor blockade, duration of analgesia as well as the incidence of side effects between the two groups.

INTRODUCTION…

Augustus Karl Gustav Bier was the first to introduce cocaine intrathecally in six patients coming for lower limb Surgery in 1898, since then spinal anaesthesia has seen many modifications from the local anesthetics to the spinal needle in use. In the last few decades, the use of regional techniques for anaesthesia and analgesia has significantly risen. This is mainly because of awareness of the benefits of regional anaesthesia particularly in an aging population riddled with a wide range of intercurrent illness.

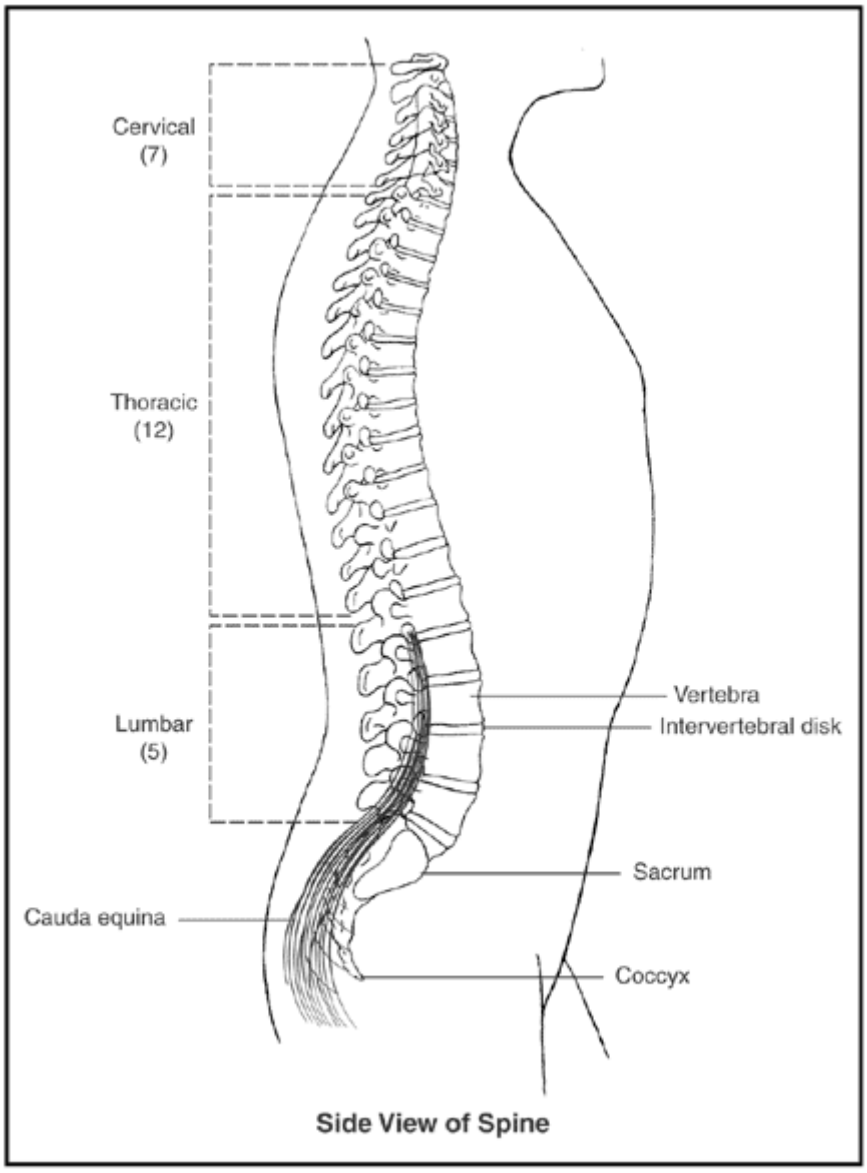
Amongst the various regional techniques, spinal anaesthesia is amongst the most commonly used, besides being easier to perform with definitive results. Though spinal anaesthesia is generally limited for procedures below the umbilicus, its usage has been in plentiful. The main advantage of spinal anaesthesia being the ability to control the level of anaesthesia and to a certain extent the duration of anaesthesia by altering the drug characteristics, dosage and patient position during and immediately after the spinal anaesthetic.

The commonly used local anaesthetic for spinal anaesthesia is

hyperbaric bupivacaine, though this gives good motor and sensory block it is associated with hypotension and at times bradycardia which can be detrimental in the elderly and those with intercurrent illnesses like hypertension, diabetes mellitus, ischemic heart disease as hemodynamic instability worsens already compromised organ function in this subset of people. Alteration of the drug characteristics can limit the degree of hemodynamic instability and this is what we aspire to do in this study.

The challenge during a subarachnoid block lies in the ability to provide enough local anaesthetic to provide adequate anaesthesia for surgery while preventing extensive cephalad spread and unwanted adverse effects.

ANATOMY

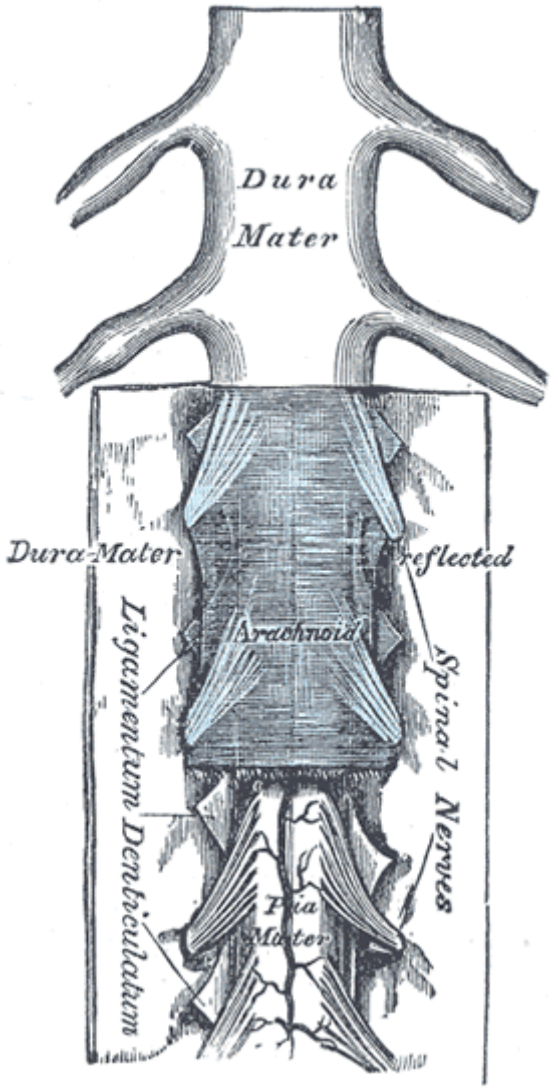


Side View of Spine

Spinal anaesthesia can successfully be used in a number of situations, but in order to conduct a safe procedure, thorough knowledge of the relevant anatomy, pharmacology of local anaesthetics, physiologic effects of spinal anaesthesia, technique and complications is necessary.

There are 33 vertebrae in the spinal column of which 7are cervical, 12 thoracic, 5 lumbar, 5 sacral and 4 are coccygeal. The vertebral column has the cervical and lumbar curves convex anteriorly, whereas the thoracic and sacral curves are convex posteriorly, this curvature of the spine along with other factors play an important role in determining the extent of spread of the local anaesthetic.

Five ligaments hold the spinal column, of these the supraspinous ligament connect the apices of the spinous processes from C7 to S2, while the interspinous ligament holds the spinous processes together. The ligamentum flavum binds the laminae above and below, while the anterior and posterior ligaments bind the vertebral bodies together.


Dura
Mater
Dura-Mater
reflected
Arachnoid
Ligamentum Denticulatum
Spinal Nerves
Pia
Mater

The spinal cord is 45cm long in the adult. It has an elongated cylindrical shape but flattened anterio posteriorly. The spinal cord begins at the foramen magnum and forms the conus medularis below, the filum terminale extends further to get attached to the coccyx. The spinal nerves below the conus medularis form the cauda equina.

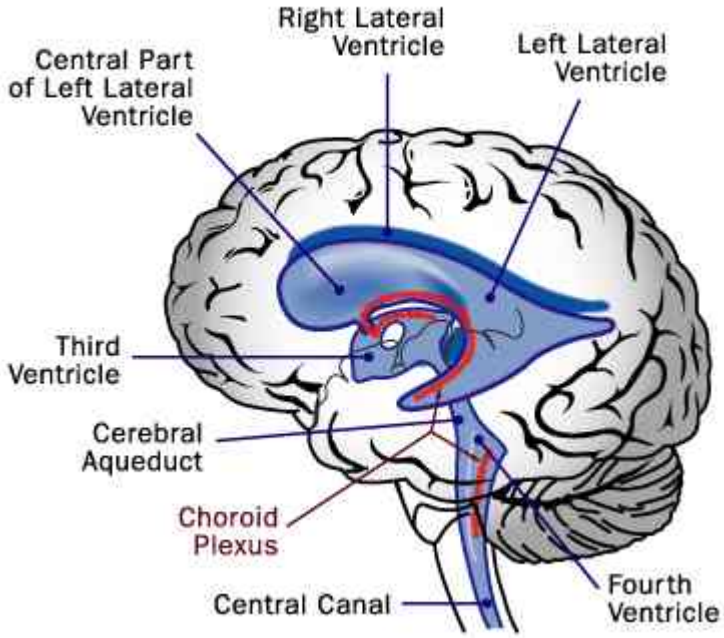
The spinal cord is covered by three meanings: dura, arachnoid and pia mater. The dura is the outermost and a tough layer, while the arachnoids forming the middle layer is a delicate non vascular layer closely attached to the dura. The pia mater is the innermost layer closely investing the spinal cord, it is a highly vascular layer.

There are three compartments closely related to the meninges, these are the epidural, subdural and subarachnoid spaces. The epidural space is outside the dura but within the vertebral canal, its contents are fat, blood vessels, nerve roots and lypmhatics, they are not distributed uniformly but appear in compartments. The subdural space is a potential one as the arachnoid membrane is in close contact with the dura separated by a thin film of serous fluid.

The subarachnoid space contains the cerebrospinal fluid and communicates with the tissue spaces around the vessels in the pia mater.

The spinal cord ends at L3 at birth but in adults reaches only up to the lower border of L1. Normally there are 31 pairs of symmetrically arranged spinal nerves attached to the spinal cord by two roots, the anterior and posterior roots. Each nerve is formed by fusion of an anterior and posterior root, immediately distal to this the posterior root carries a ganglion. The anterior roots are motor while the posterior roots are sensory.

The Ventricular System of the Human Brain



The blood supply comes from the anterior spinal artery which supplies the entire length of the cord in front of the posterior grey column, while the posterior spinal artery supplies the posterior grey and white columns on either side. In many patients an important source of blood supply to the lower half of the spinal cord is from the artery of Adamkiewicz, which is a direct supply from the aorta usually arising at the 11^{th} thoracic space. Venous drainage is by a plexus of anterior and posterior spinal veins which eventually drain into the segmental veins that communicates with the medullary vein [1, 2, 3].

Cerebrospinal Fluid (CSF)

CSF is formed by the secretory cells of the choroid plexus which is in communication with the lateral, third and fourth ventricle. CSF flows via the third ventricle through the aqueduct and fourth ventricle to enter the subarachnoid space through the two lateral foramen of Luchska and median foramen of Magendie. The total volume of CSF in an adult is about 150ml, produced at the rate of 0.35-0.40 ml/ min or 500-600ml in a day, the turnover time being 5-7hrs. Half of this volume is present intracranially and rest is in the subarachnoid space into which the injected drug gets distributed. [60]

CSF is an isotonic, aqueous medium with a composition similar to interstitial fluid. The density of CSF at 37^0C has a range of 1.0000-1.0006 with a mean of 1.0003 g/liter. However, in humans CSF density is not uniform and varies with age, sex, pregnancy and illness.[4, 5] CSF is not static and continuously oscillates with arterial pulsations, studies have indicated that the extent and duration of spinal anaesthesia with isobaric bupivacaine depend on the CSF velocity. [6]

PHARMACOLOGY OF LOCAL ANAESTHETICS

Successful spinal anaesthesia requires a sound knowledge of the pharmacology of local anaesthetics administered in the intrathecal space.

Local anaesthetics act by blocking neuronal conduction. The normal resting membrane potential is -60 to -70 mV resulting from a dynamic balance between ionic concentration gradients maintained by the Na^+/K^+ ATPase pump and the diffusion potential of ions, mainly Na^+ and $^{K+}$. When an action potential is generated the resting membrane potential reaches threshold potential, resulting from activation of Na^+/K^+ ATPase which pumps 3 molecules of Na+ extracellularly for 2 molecules of K+ intracellulary, creating an electrical field across the cell membrane. [7] The Na+ channel exists in three states: closed, active and inactive. Local anaesthetics can block the channel in the active state as Na+ conduction occurs only during this state. [8]

Local anesthetic inhibition of Na+ currents increases with repetitive depolarizations in a process called phasic block. Phasic block represents increased LA binding, either because more channels become accessible during depolarization or because the channel conformations favored by depolarization bind LA with higher affinity. [9]

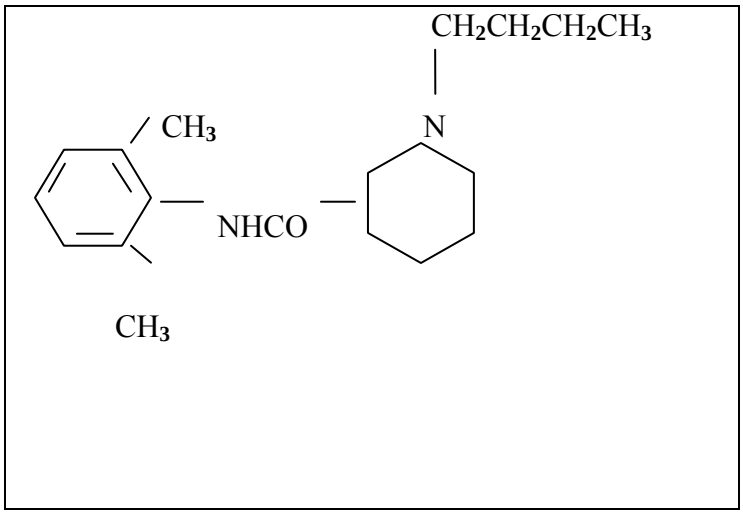
Thus, local anaesthetic solutions cause reversible blockade of impulse propagation in a manner that is both time and voltage dependant, resulting in an increased threshold for activating the action potential.[10] **Anaesthetic potency** The clinically useful local anaesthestics have a lipophilic, substituted benzene ring linked to a hydrophilic amine group via an ester or amide linkage, this linkage results in two chemically distinct groups the aminoamides and the aminoesters.

Local anaesthetic potency, speeds of onset, duration of action is determined by the dissociation constant pKa, lipid solubility and degree of protein binding. [11]

BUPIVACAINE – Pharmacology

Group – Amino amide

Chemistry



Systematic name

(*RS*)-1-butyl-*N*-(2,6-dimethylphenyl) piperidine-2-carboxamide

Chemical data

Formula: $C_{18}H_{28}N_2O$

Molecular weight: 288.43 g/mol

Pharmacokinetic data

pH: 8.1

Protein binding: 95%

Lipid solubility: highly lipid soluble

% ionized at pH 7.4: 83%

Metabolism: Hepatic

Elimination half life: 3.5 hrs

Excretion: Renal

Toxic dose: 2.5-3 mg/Kg

Toxic plasma concentration: >3 mcg/ml

Specific features

More cardio toxic than other local anaesthetics

CVS: CNS ratio 2.0 [12]

DETERMINANTS OF CLINICAL EFFICACY OF SPINAL ANAESTHESIA

Distribution of local anaesthetics in the subarachnoid space determines the extent of sensory and motor block, the uptake into neuronal tissues determines which neuronal function is affected while their elimination dictates the duration of action.

A number of factors affect the distribution of local anaesthetics in the subarachnoid space [13], the most important factor is the baricity of the injected solution, and others are the dose of the local anaesthetic and position of the patient during and just after the spinal block. [13,14,15,16,17,18]

About a decade ago Barker was the first to study the factors affecting intrathecal spread of local anaesthetics, he deduced that gravity and the lumbosacral curves can be used to influence the spread of local anaesthetic made hyperbaric with addition of glucose.[19]

Table 1

Factors affecting intrathecal spread of local anaesthetics, modified from [31]

Characteristics of injected solution	Technique	Patient characteristics
Baricity Volume=dose=concentration Temperature of injectate Viscosity Additives	Patient position Level of injection Needle type=alignment Intrathecal catheters Fluid currents Epidural injection	Age Height Weight Sex Intra-abdominal pressure Spinal anatomy Lumbosacral cerebrospinal fluid volume Pregnancy

Baricity

It is the density of the local anaesthetic to the density of CSF at 37o C, it is this factor that determines the spread of the local anaesthetic in the subarachnoid space. Hypobaric local anaesthetic has a lesser density than CSF and hence tends to rise against gravity isobaric solutions have a similar density to CSF thereby get distributed around the site of injection, gravity ideally does not affect its spread.

On the other hand a hyperbaric solution is denser than CSF and tends to follow gravity. As these local anaesthetics depend on gravity to determine the extent of spread, it goes without saying that the patient's position immediately after a spinal block determines the point of gravity, thereby affecting the spread of the anaesthetic.

Hyperbaric solutions have a more predictable spread but to high levels of blockade can have detrimental cardio respiratory effects, on the other hand plain solutions commonly are unpredictable in their extent of spread. [20, 21.] The average specific gravity of CSF is 1.0069. The baricity of the study drug (1.5ml of 0.5% bupivacaine + 1.5ml of sterile saline) estimated in our hospital was found to be 1.0061.

Volume/dose/concentration injected

It is impractical to change one factor without changing the other, hence studies trying to determine the role of each factor are difficult to perform, nevertheless most studies attempting this have shown that drug dose to be more important. [22,23,24,25]

Temperature of injectate

The baricity may change slightly with different temperature, even this small change can make a hypobaric solution hyperbaric or vice versa. Local anaesthetics are injected into the CSF at room temperature (~24oc) when it enters the CSF there might be a local drop in Temperature which recovers quickly, the injected solution is then at body temperature and might behave differently than expected due to changes in baricity. [26]

CLINICAL TECHNIQUE

Patient position

The interplay between density and patient position due to the effects of gravity makes posture an important determinant in deciding the extent of spinal block. True isobaric solutions should ideally not be affected by patient posture.

Level of injection

Greater level of cephalad spread is seen when a higher level of injection is given with plain solutions, this finding is however less consistent with hyperbaric solutions. [27,28,29]

PATIENT CHARACTERISTICS

Age, height, weight, sex

At the extremes of age there are small but significant increases in maximum spread, rate of onset of motor block and cardiovascular instability, regardless of the solution used. It is probable that these are secondary to age-related changes in spinal anatomy, nerve physiology and cardiovascular reflexes. [30] Increased body mass index has shown to result in a higher cephalad spread of local anaesthetic, the epidural fat is considered to compress the dural sac, decrease the CSF volume resulting in an increased spread. Gender has no role to play in the spread of local anaesthetics.[31]

ASSESSMENT OF SPINAL BLOCK

There are numerous studies attempting to study the factors affecting the intrathecal spread of local anaesthetic in the CSF to use these in the clinical setting will be impractical. There are

indirect measures by which degree or height of spinal block can be measured. This is done by assessing for loss of sensory, motor and autonomic function which are blocked by spinal anaesthesia. There are various types of nerve fibers, each of which have different features. The preganglionic B fibers carry autonomic impulses while the C fibers carry post ganglionic sypmpathetic nerve fibers, both of these are more sensitive to blockade by local anesthetic than the A fibers.

The A fibers are further divided into α, β, λ, δ, which carry proprioception, touch pressure, light touch and motor fibers respectively, of these A λ are largest in diameter and are more difficult to block. The variation in response to local anaesthetics results in a differential blockade, clinically this translates as different levels of neural blockade, autonomic nerves are blocked at a higher level than sensory which in turn is blocked at a higher level than motor, these are generally separated by two or more segments. In practice, height of block starting from a non anaesthetised area is checked for temperature (response to cold), pinprick, while motor block is assessed by using modified Bromage scale as follows:

Grade	Definition
0	No motor block
1	Inability to raise extended leg; able to move knees and feet
2	Inability to raise extended leg and move knee; able to move feet
3	Complete block of motor limb

PHYSIOLOGIC EFFECTS OF SPINAL ANAESTHESIA

Cardiovascular effects

Spinal anaesthesia results in a temporary sympathetectomy because of this there is a drop in blood pressure from a combination of decrease in venous return that serves to decrease preload and cardiac output, and, arterial dilation causing a drop in systemic vascular resistance. There are two mechanisms by which sympathetic blockade of venous and arterial blood vessels occur; one is by direct inhibition of the nerves innervating the blood vessels, the other being a decrease in circulating catecholamines by inhibition of nerves supplying the adrenal gland. [7] Risk factors for development of hypotension during spinal anaesthesia

- Increasing age
- Block height higher than T5
- A baseline systolic blood pressure <120 mm of Hg
- Dural puncture at or above L2-L3 interspace
- Combined general and neuraxial anaesthesia

Heart rate is a complex function of a balance between the sympathetic and parasympathetic nervous systems. The effect of spinal anaesthesia on heart rate is inversely proportional to the spinal block height, higher the block lesser the heart rate. Maintenance of adequate preload may be the key to a decrease in the incidence of bradycardia [32]

Respiratory effects

Spinal block height limited to lumbar and lower thoracic region have minimal clinical consequences on the respiratory system, however a block height of T5 and above may affect the ability to cough and clear secretions, this can adversely alter respiratory function in patients with respiratory disorders. There is a decrease in the oxygen demand and consumption during spinal anaesthesia probably as a result reduced metabolic demand due to decreased cardiac workload, muscle paralysis and a decrease in overall metabolism. [33]

Central nervous system effects

Blood flow to the central nervous system remains constant because of auto regulation of cerebral blood flow except when there is profound hypotension (mean arterial pressure of < 55 mm of Hg in a normotensive individual)[7]

Coagulation system

By influencing blood flow and altering Virchow's triad, neuraxial anaesthesia may be associated with a decreased incidence of deep vein thrombosis and pulmonary embolism as compared to general anaesthesia [34]

COMPLICATIONS OF SPINAL ANAESTHESIA

Nerve injury

Permanent or disabling nerve injury is a rare occurrence, seen as a result of direct trauma to the nerve during needle placement. Auroy et al in their survey found that two thirds of patients who developed nerve injury had parasthesia during needle placement. [59]

Post dural puncture headache (PDPH)

PDOH is one of the commonest complications of spinal anaesthesia, with an incidence of less than 3%. It occurs due to CSF leakage from the dural defect left by the spinal needle. CSF leakage, if greater than the its production, can result in low CSF pressures, this causes traction on the intracranial contents with pain referred via the trigeminal nerve to the frontal area and via the gloss pharyngeal, vagus, cervical to the occiput, neck and shoulders, when the patient assumes the upright posture. PDPH generally presents in 15-48hrs and resolves in 10days in over 90% of patients. Treatment is with bed rest, adequate hydration, analgesics (NSAID's) and caffeine.

Local Anaesthetic toxicity

Though most local anaesthetics have the potential to cause neuronal damage, when used in the recommended dosage and concentrations, toxicity rarely occurs.

Spinal Hematoma

Most cases developing a spinal hematoma have a coagulation defect, the remaining probably had a difficult needle placement or a bloody tap. A large hematoma if not detected and treated early can result in permanent neurological deficit. Careful patient selection and procedure can avoid this complication.

Central neural infections

Arachnoiditis, meningitis, spinal abscess are rare after spinal anaesthesia. They can occur due to an exogenous source like contaminated equipment, procedure or medication, alternatively it can

be a result of endogenous source by seeding of bacteria from a remote site, making sepsis a relative contraindication for some anaesthetists.

REVIEW OF LITERATURE

There are many factors that affect the spread, intensity and duration of spinal anaesthesia but which factor carries more importance is the question posed by many investigators. In 1987 Lambert and Covino [35] in their article on the understanding of density and patient positioning on success of spinal anaesthesia suggested that in procedures requiring spinal anaesthesia, if the surgery is above L1 then hyperbaric bupivacaine is more suitable but if the surgery is below L1 then isobaric bupivacaine is ideal as it can provide adequate anaesthesia without extensive dermatomal spread.

In our study 3ml of 0.25% isobaric bupivacaine was the study drug and 1.5ml 0.5% hyperbaric bupivacaine was the control drug, the total dose however kept constant at 7.5mg was based on few studies that showed dose of local anaesthetic being more important than the concentration or the volume of bupivacaine.

In 1990 LANZ et al [36] conducted a double blinded study on 60 patients, who were given varying concentration and volume of isobaric bupivacaine while keeping the total dose of bupivacaine same, they found no difference among the groups with regard to the speed of onset, maximal spread, regression of sensory and motor block except in the group which received 10 ml of 0.175% isobaric bupivacaine where complete regression was faster, they however concluded that the dose was more important than either volume or concentration in isobaric bupivacaine.

A similar study by Malinovsky [37] in 1999 compared different volumes of isobaric and hyperbaric bupivacaine, they concluded that volume did not affect the extent of cephalad spread or duration of anaesthesia, but offset of anaesthesia was shorter with hyperbaric bupivacaine compared to isobaric bupivacaine.

Thage et al [24] in their review of factors affecting spread of anaesthesia stated that the dose of bupivacaine was significant importance while the age, baricity and speed of injection was of modest importance. Teckelenburg-Weier et al [38] as well compared the effect of patient positioning (Tredelenburg) on the spread of sensory block after spinal anaesthesia using hyperbaric and isobaric bupivacaine, they concluded that the baricity did not influence the spread of the drug. As clearly stated by Hocking and Wildsmith [39] in their review article on intrathecal drug spread, though many factors affect the spread of a local anaesthetic, their role is minor unpredictable and at times beyond the physician's control. The major factors are the baricity of the solution and the position of the patient immediately after the spinal block.

The primary aim in our study was to evaluate whether isobaric bupivacaine provides more stable hemodynamics compared to hyperbaric bupivacaine, this hypothesis was based on many previous studies, but our study population was exclusively ASA II and ASA III patients which has not been done before and in whom acquirement of stable hemodynamics is most desirable.

Phelan et al [40] concluded that hyperbaric bupivacaine resulted in a more rapid fall in blood pressure but had a more predictable dermatome level compared to isobaric bupivacaine after conducting a study on 67 patients in which p value was found to be statistically significant.

Shimai et al [41] when conducting a study on 45 patients with differing baricity and volume but same concentration found a more severe drop in blood pressure with hyperbaric bupivacaine of comparatively larger volume, their suggestion was that adequate anesthesia with a lesser drop in blood pressure could be obtained with a larger volume but lesser baricity of bupivacaine or a lower volume and higher baricity.

In this study by Vernhiet J et al [42] conducted on 264 patients hyperbaric bupivacaine was found to a faster onset, higher level and longer duration of spinal block but had a greater fall in blood pressure than isobaric bupivacaine.

Rama et al [43] in their study done in 2002 on 60 patients comparing hyperbaric, isobaric and hypobaric bupivacaine found no difference in the hemodynamic changes, level of analgesia, degree of motor block or duration of anaesthesia amongst all three groups.

Roberts et al [44]in a double blind study of 90 patients observed that hyperbaric bupivacaine provides rapid and intense sensory block of intermediate duration while isobaric bupivacaine provides a longer duration of action with a lesser block height and lesser cardiovascular disturbance.

Siaens et al [45] compared three different solutions of bupivacaine for spinal anaesthesia. Group 1 received 10mg hyperbaric bupivacaine, group 2 got 10mg isobaric bupivacaine while group 3 received 15mg isobaric bupivacaine. In the first two groups cephalad spread, analgesia duration, motor block and the decrease in mean arterial pressure were comparable. But group 3 had a higher cephalad spread, longer duration of analgesia and more pronounced motor block, though the mean arterial pressure drop was comparable to the other groups.

Tattersall [46] compared isobaric bupivacaine (15mg) with hyperbaric amethocaine (10-16mg) in 123 patients undergoing various surgeries. Patients who received isobaric bupivacaine had a comparatively limited spread of analgesia that lasted longer associated with lesser hypotension.

MATERIALS AND METHODS

A randomized double blinded study was conducted on ASA II and ASA III patients coming for lower limb surgery. Sample size estimation was done based on a similar study by Paul et al 2001 where the mean difference in the outcome (SD) was 11.69. For a level of significance of 5% and power of study of 80%, sample size was estimated to be 180 in each group.

Inclusion criteria

- Age more than 20 years (adult patients)
- ASA II and ASA III
- Lower limb general surgery procedures like debridement, amputation, split thickness skin grafting

Exclusion criteria

- Patient refusal
- Coagulation disorders
- Current treatment with antiplatelets except aspirin
- Sepsis
- Dehydration
- Spinal canal anomalies
- Height <150cm

Randomization

Randomization of 130 patients was done using shuffled sealed envelopes after generating the random numbers from a computer. Block randomization was done to ensure equal allocation in

each group, resulting in 65 patients in each group. The patient and outcome assessor was blinded to the drug making it a double blinded study.

Control group: received 1.5ml of 0.5% hyperbaric bupivacaine

Study group: received 3ml of isobaric 0.25% isobaric bupivacaine

For the study drug 1.5ml of 0.5% bupivacaine was diluted with 1.5ml of saline (sterile)

Procedure

After taking informed consent, demographic criteria and a recording of preoperative systolic and diastolic blood pressure was noted. An intravenous line with an 18G or 20G cannula was established. All patients received 1mg of IV midazolam for anxiolysis. Preloading with 500ml of crystalloid solution was done for all patients to reduce possible hypotension, further fluids were given at a maintenance rate of 2ml/kg apart from replacement of blood loss. All patients received 6l/min of O_2 via a face mask.

Standard monitoring was done in both groups utilizing electrocardiography, non invasive blood pressure measurement and pulse oximetry.

Assessment and management

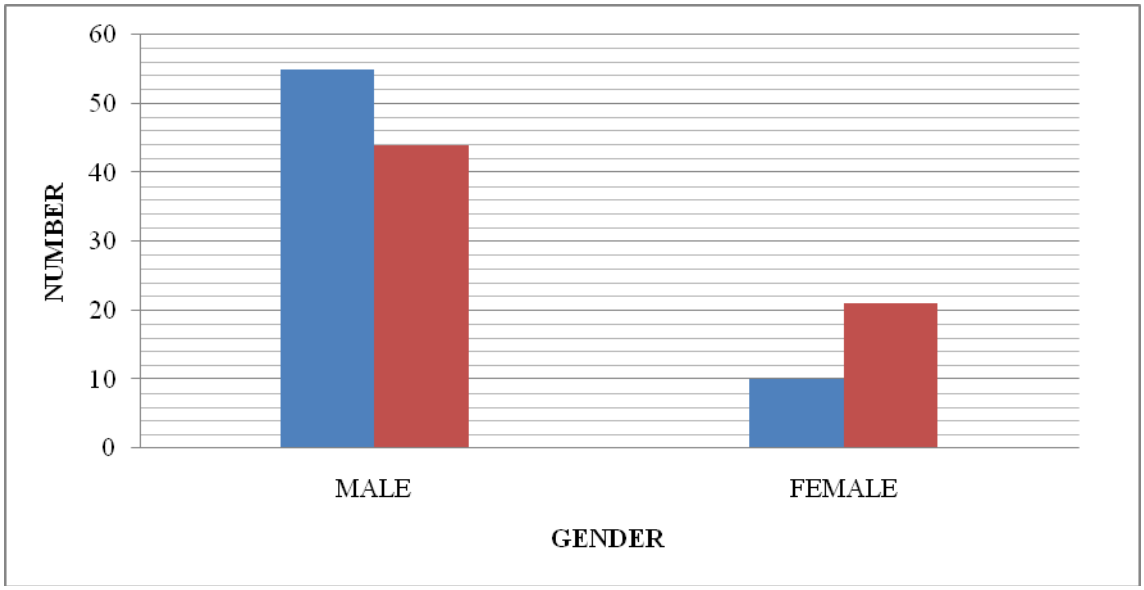
After taking a baseline recording of heart rate, systolic blood pressure, diastolic blood pressure, mean blood pressure and oxygen saturation, recording were noted every 3mins for the first 15mins, then every 5 mins for half an hour, every 10mins for one hour and then every 15mins thereafter. A drop in systolic blood pressure to less than 100 mm of Hg or 20% from baseline, or a drop in mean arterial pressure of less than 65mm of Hg or 20% from baseline was treated with intravenous boluses of either 50 – 100 mcg of phenylephrine or 5mg of ephedrine.

A heart rate of less than 50bpm was treated with IV atropine 0.6mg. A drop in saturation or respiratory difficulty if any was treated with assisted ventilation using 100% O_2 Sensory block assessment was done using pin prick while motor block was assessed using the modified Bromage scale. Time for onset was taken from the time of giving intrathecal drug to onset of block. Duration of sensory block was taken from the time of onset to complete regression of the block. Incomplete or patchy block was given general anaesthesia or the procedure was repeated, supplemental analgesia was provided whenever needed with boluses of intravenous fentanyl or morphine, till pain free.

Technique

Patient was positioned in the lateral position with the affected limb in the dependant position. The back, hips and knees were flexed by an assistant to facilitate needle placement. Subrachnoid block was performed with 25G Whitacre needle at L3-4 or L4-5 interspace, on clear tap of CSF, the drug was injected after reconfirmation of CSF aspiration. Patient was then placed supine and assessment done.

RESULTS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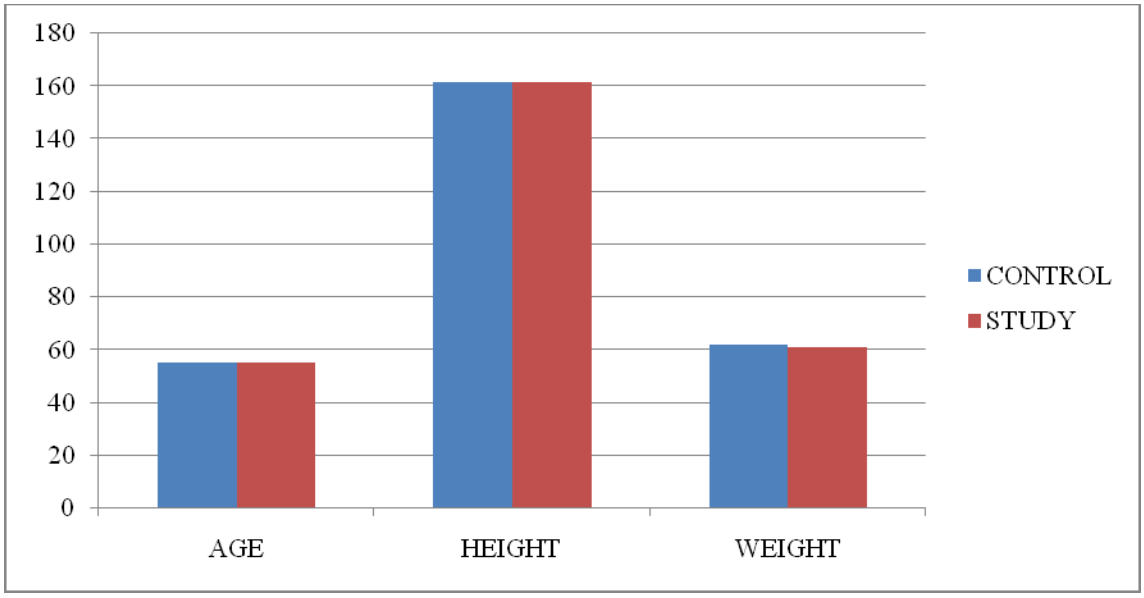
180
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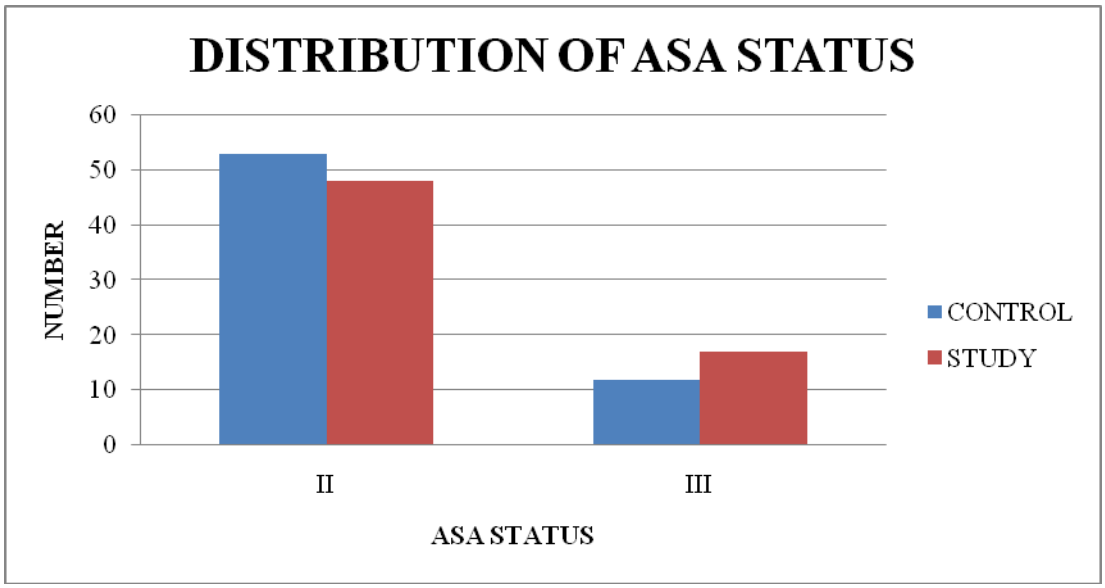
AGE
HEIGHT
WEIGHT
CONTROL
STUDY

DEMOGRAPHIC DATA

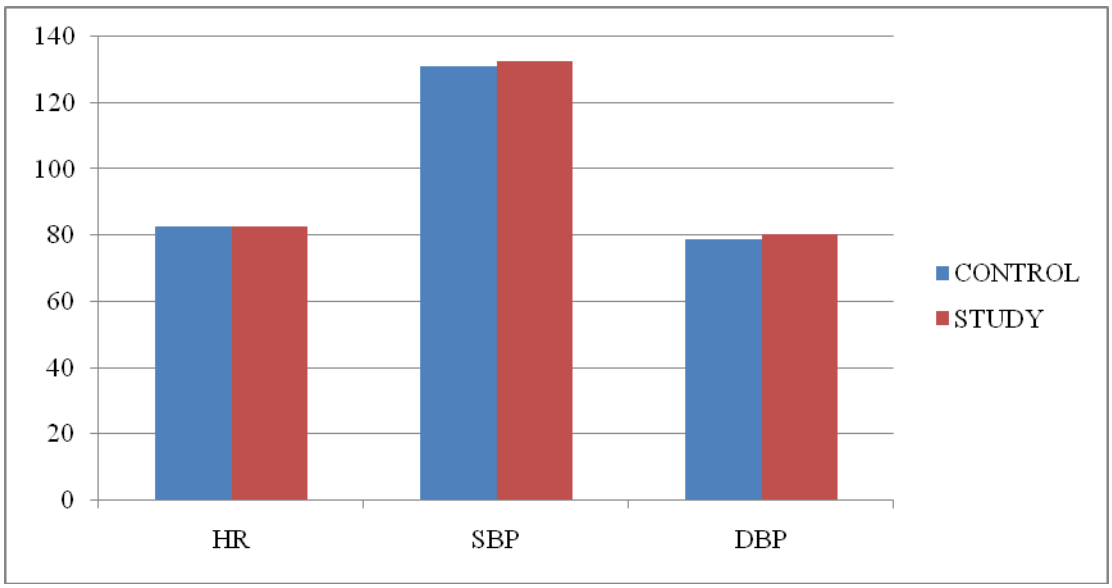
	MALE	**FEMALE**
CONTROL (in no.)	**55**	**10**
STUDY (in no.)	**44**	**21**

Mean ± S.D	**AGE**	**HEIGHT**	**WEIGHT**
CONTROL	55.11 ± 10.11	161.66 ± 13.5	61.91 ± 9.13
STUDY	55.28 ± 10.8	161.6 ± 7.25	61.22 ± 10.86

There was no significant difference between the two groups with regard to age, gender, height and weight



PRE-OPERATIVE VITALS



PATIENT VARIABLES

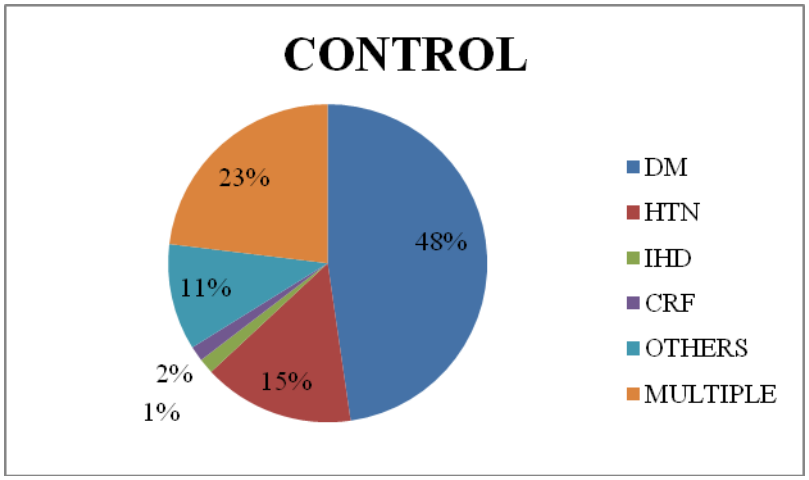
	ASA II	**ASA III**
CONTROL (in no.)	**53**	**12**
STUDY(in no.)	**48**	**17**

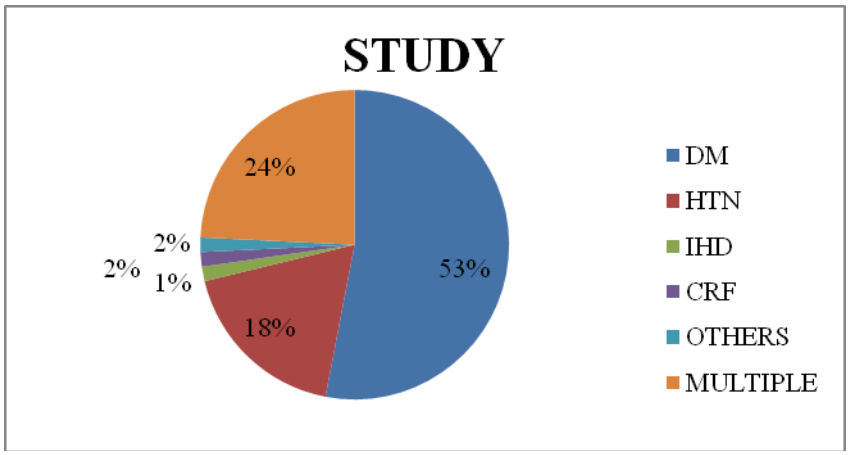
PRE OP VITALS

Mean ± S.D	**Heart rate**	**Systolic blood pressure**	**Diastolic blood pressure**
CONTROL	82.57 ± 13.73	131.08 ± 17.47	78.8 ± 11.95
STUDY	82.77 ± 13.15	132.48 ± 17.18	80.25 ± 10.85

The distribution of ASA II and ASA III patients in both the groups were comparable, there was not much difference between preoperative vitals in both the groups.

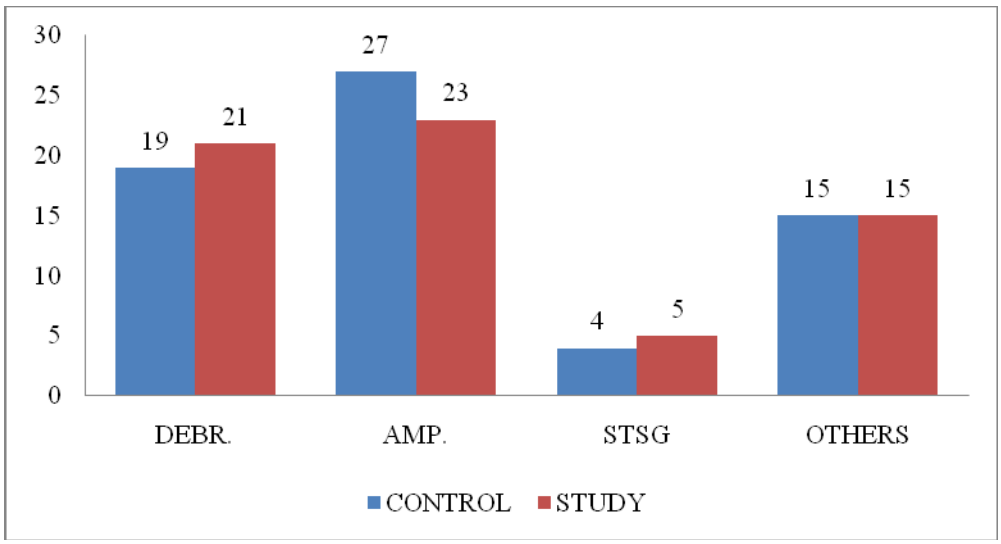
DISTRIBUTION OF SYSTEMIC ILLNESSES BETWEEN THE TWO GROUPS





DISTRIBUTION OF SYSTEMIC ILLNESSES BETWEEN THE TWO GROUPS

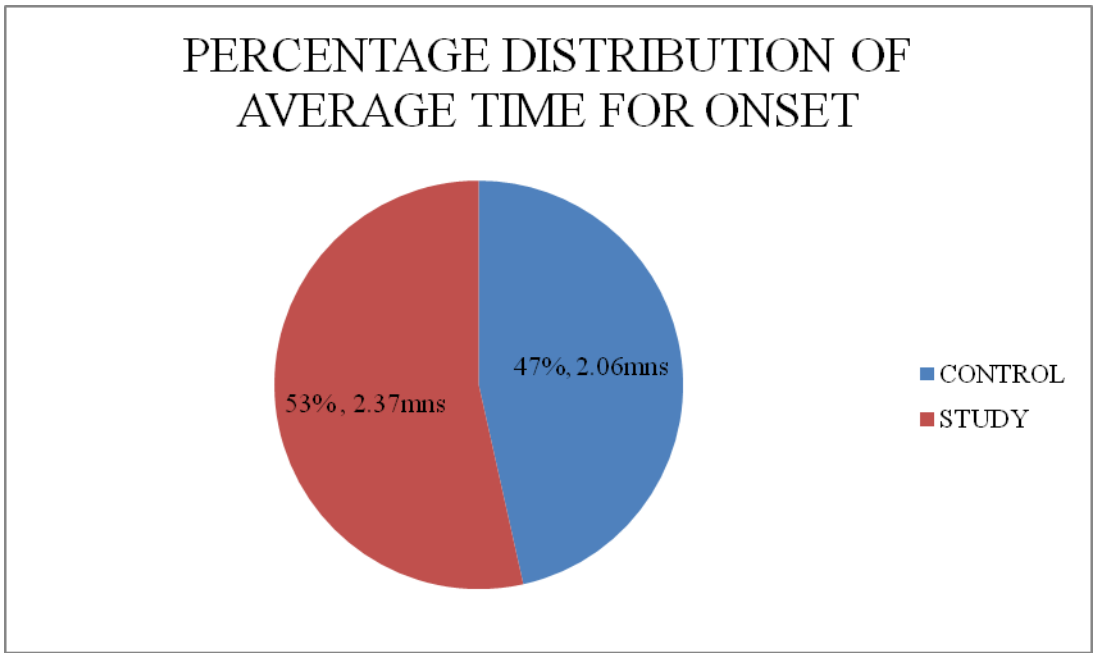
	DM	HTN	IHD	CRF	OTHERS	MULTIPLE
CONTROL (in no.)	**31**	**10**	**1**	**1**	**7**	**15**
STUDY(in no.)	**35**	**12**	**1**	**1**	**1**	**16**

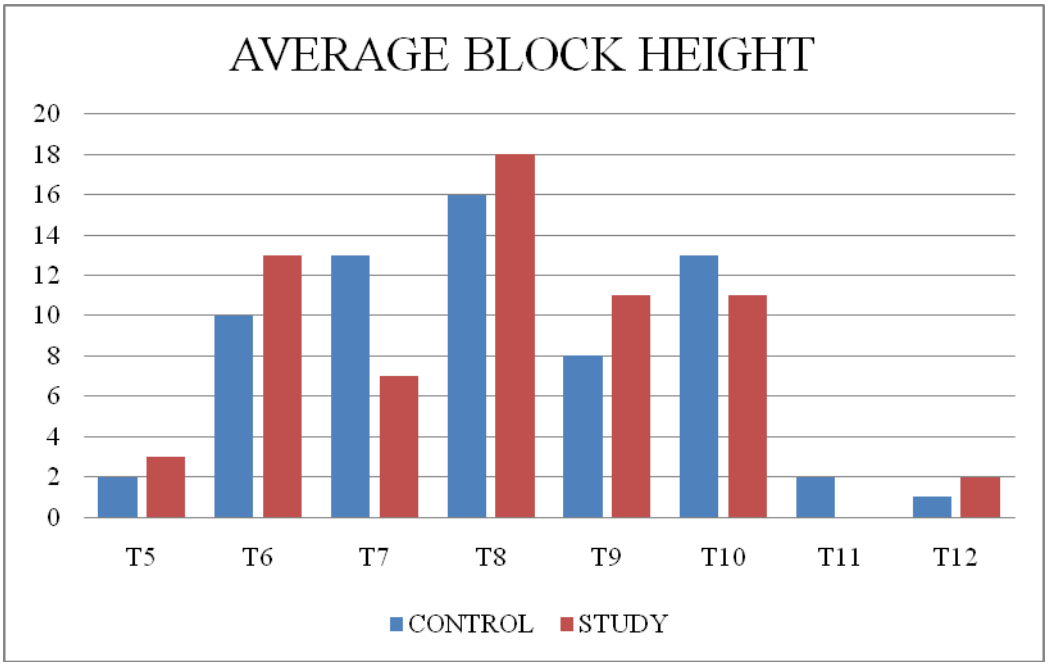

30
25
20
15
10
5
0
19
21
27
23
4
5
15
15
DEBR.
AMP.
STSG
OTHERS
CONTROL
STUDY

DISTRIBUTION OF SURGERIES BETWEEN THE TWO GROUPS

	DEBR.	**AMP.**	**STSG**	**OTHERS**
CONTROL (in no.)	**19**	**27**	**4**	**15**
STUDY (in no.)	**21**	**23**	**5**	**15**

The distribution of the systemic illnesses and type of surgery was similar in both groups.


PERCENTAGE DISTRIBUTION OF AVERAGE TIME FOR ONSET
47%, 2.06mns
53%, 2.37mns
CONTROL
STUDY


AVERAGE BLOCK HEIGHT
20
18
16
14
12
10
8
6
4
2
0
T5
T6
T7
T8
T9
T10
T11
T12
CONTROL
STUDY

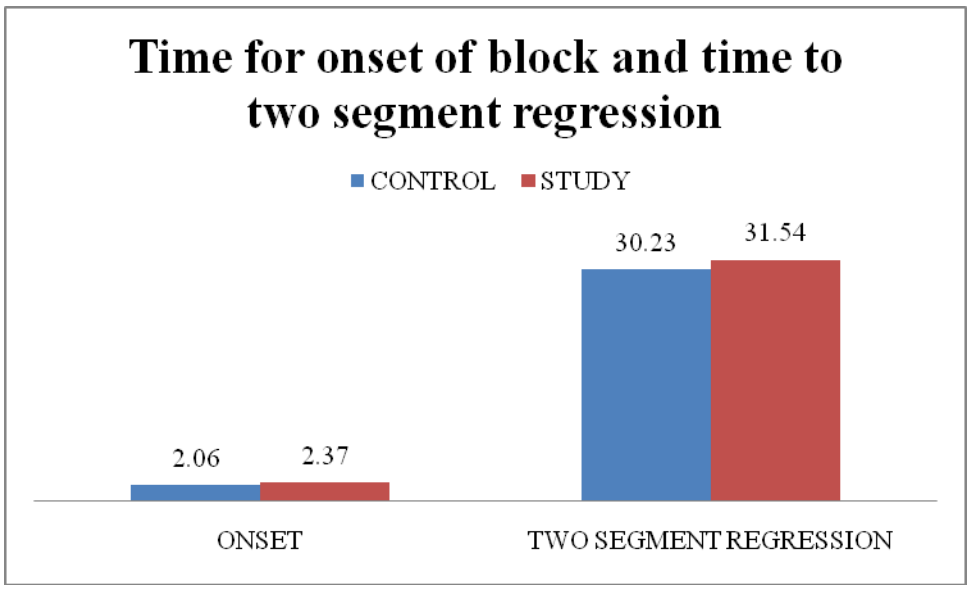
TIME FOR ONSET OF MAXIMAL CEPHALAD BLOCK

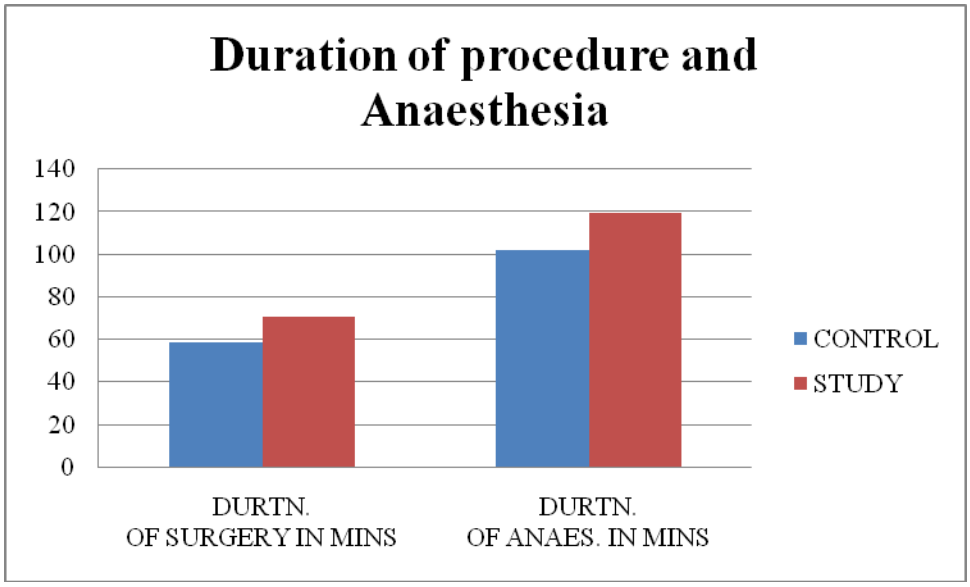
	Average onset in mins	Percentage distribution	Std.deviation	p value
CONTROL	2.06	47%	1.014	0.12
STUDY	2.37	53%	1.219	

AVERAGE DERMATOMAL SPREAD OF SENSORY ANAESTHESIA

	CONTROL	STUDY
T5	2	3
T6	10	13
T7	13	7
T8	16	18
T9	8	11
T10	13	11
T11	2	0
T12	1	2

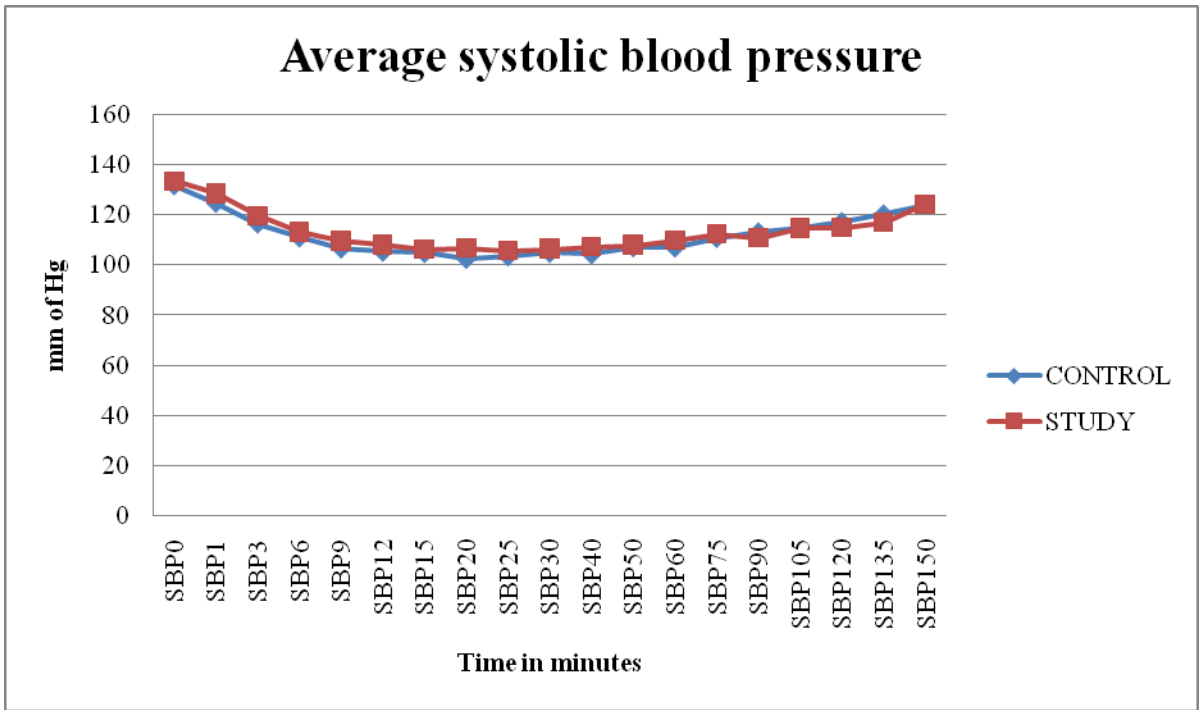
The average spread of maximal sensory block was T8 in both groups, which is higher than required, while the mean onset of spinal anaesthesia was about 2mins in both groups.

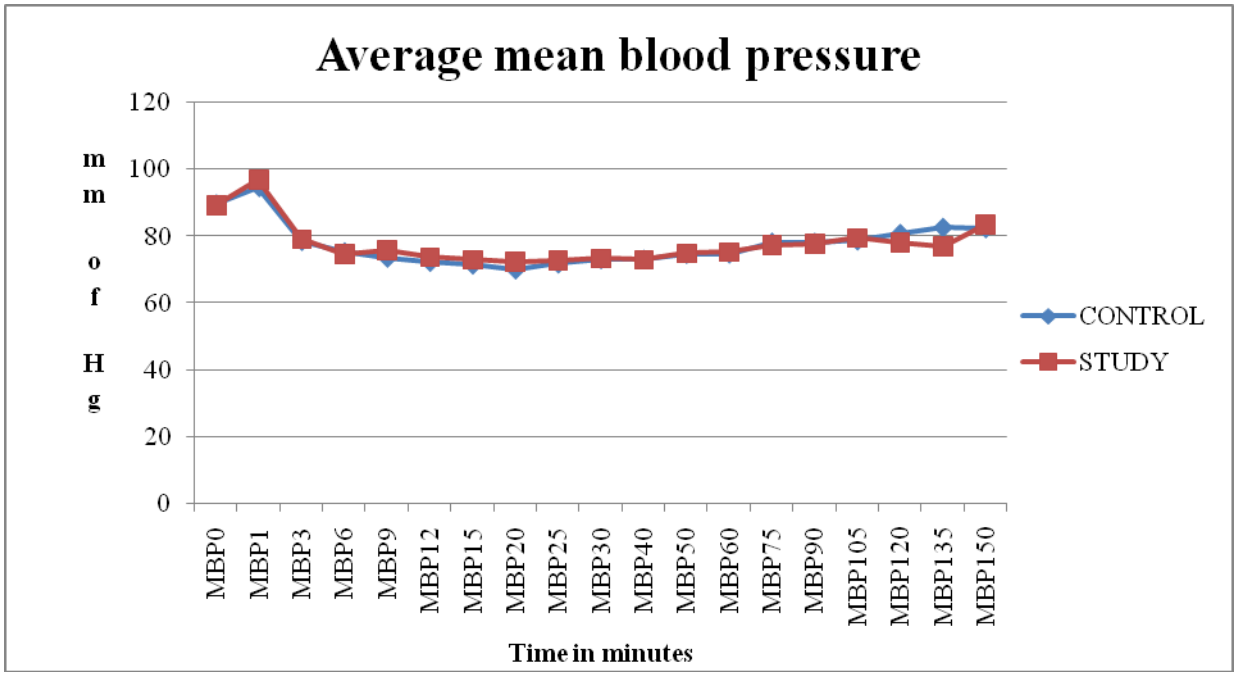

Time for onset of block and time to two segment regression
CONTROL
STUDY
30.23
31.54
2.06
2.37
ONSET
TWO SEGMENT REGRESSION


Duration of procedure and Anaesthesia
140
120
100
80
60
40
20
0
DURTN. OF SURGERY IN MINS
DURTN. OF ANAES. IN MINS
CONTROL
STUDY

Values in mins. ± S.D	CONTROL	STUDY	p value
Time to block onset	2.06 ± 1.014	2.37 ± 1.219	0.12
Two segment regression	30.23 ± 8.265	31.54 ± 7.011	0.33
Duration of surgery	58.38 ± 26.05	70.62 ± 30.61	.015
Duration of anaesthesia	101.85 ± 24.07	119.54 ± 26.51	0.00*

The time for onset of maximal cephalad block and two segment regression did not differ between the two groups, but duration of anaesthesia was significantly longer in the study group with a p value of 0.000.

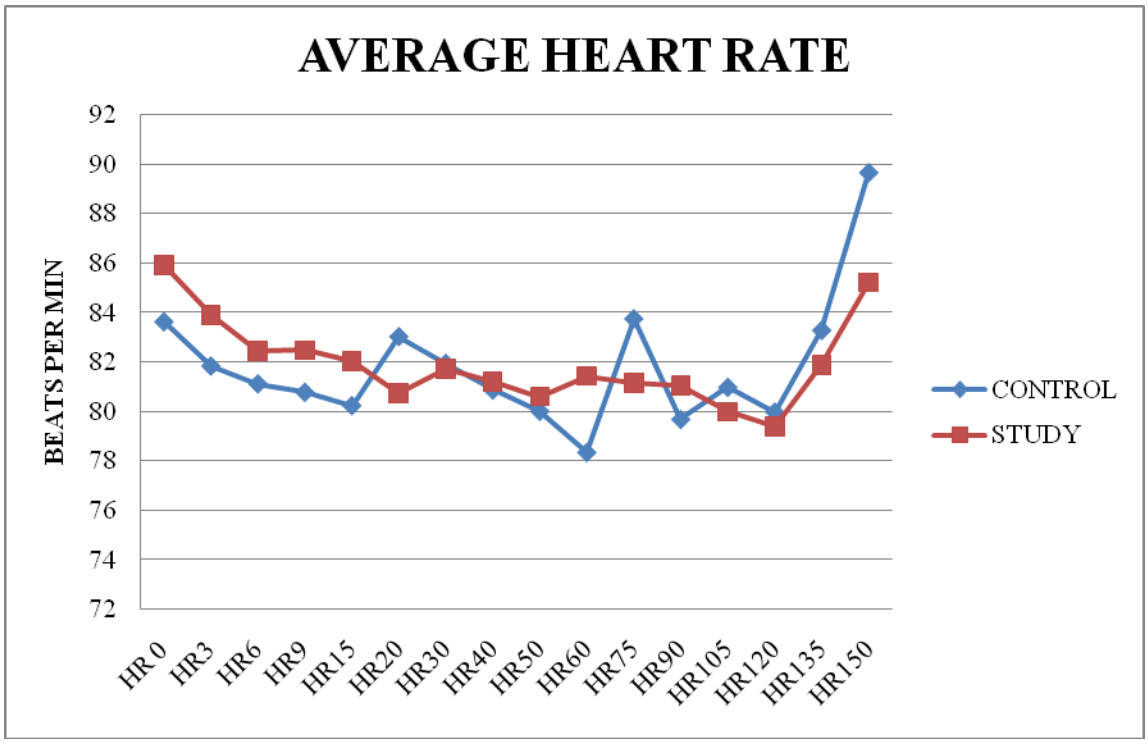

Average systolic blood pressure
160
140
120
100
80
60
40
20
0
mm of Hg
SBP0
SBP1
SBP3
SBP6
SBP9
SBP12
SBP15
SBP20
SBP25
SBP30
SBP40
SBP50
SBP60
SBP75
SBP90
SBP105
SBP120
SBP135
SBP150
Time in minutes
CONTROL
STUDY


Average mean blood pressure
120
100
80
60
40
20
0
mm of Hg
MBP0
MBP1
MBP3
MBP6
MBP9
MBP12
MBP15
MBP20
MBP25
MBP30
MBP40
MBP50
MBP60
MBP75
MBP90
MBP105
MBP120
MBP135
MBP150
Time in minutes
CONTROL
STUDY

AVERAGE BLOOD PRESSURE (SYSTOLIC AND MEAN) IN BOTH GROUPS

Time in mins	Control SBP	Study SBP	p value		Control MBP	Study MBP
0	131.89 ± 17.38	133.54± 17.66	0.59	0.95	89.5± 11.74	89.43± 10.8
3	116.54 ± 19.05	119.77 ±18.72	0.32	0.79	78.58± 12.19	79.18± 14.24
9	106.59 ± 15.44	109.05 ±21.45	0.45	0.19	73.60 ±10.3	76.05± 10.78
15	104.74 ±12.11	106.15 ± 18.24	0.60	0.39	71.58± 10.25	73.12± 10.21
20	102.40± 12.46	106.80 ± 15.6	0.67	0.18	76.11± 10.38	72.46± 9.76
30	104.77± 11.31	106.52 ± 11.66	0.38	0.82	73.18± 8.52	73.51 ±8.07
40	104.25 ±10.38	107.17 ± 12.49	0.14	0.98	73.15± 8.34	73.12 ±11.6
50	107.03 ±10.26	108.00 ± 11.37	0.61	0.86	74.75 ±8.46	75.03± 9.33
60	10.94 ±9.36	109.92 ± 11.16	0.16	0.73	74.82 ±8.18	75.42± 11.64
75	110.80 ± 8.94	112.38 ± 12.6	0.42	0.61	78.23± 7.99	77.45 ±9.05
90	113.3 ± 9.19	110.85 ± 14.11	0.28	0.84	78.17 ±7.33	77.85± 9.08
105	114.59 ± 10.12	114.68 ± 10.36	0.96	0.61	78.70 ±6.93	79.56± 9.31
120	117.41± 12.88	115.07 ± 9.80	0.37	0.20	80.79 ±8.28	78.35 ±7.77
135	120.46± 14.15	117.10 ± 10.74	0.39	0.24	82.2 ±8.73	77.10± 15.59
150	124.17 ±15.56	124.46 ± 12.7	0.96	0.74	82.33± 7.65	83.69 ±8.47

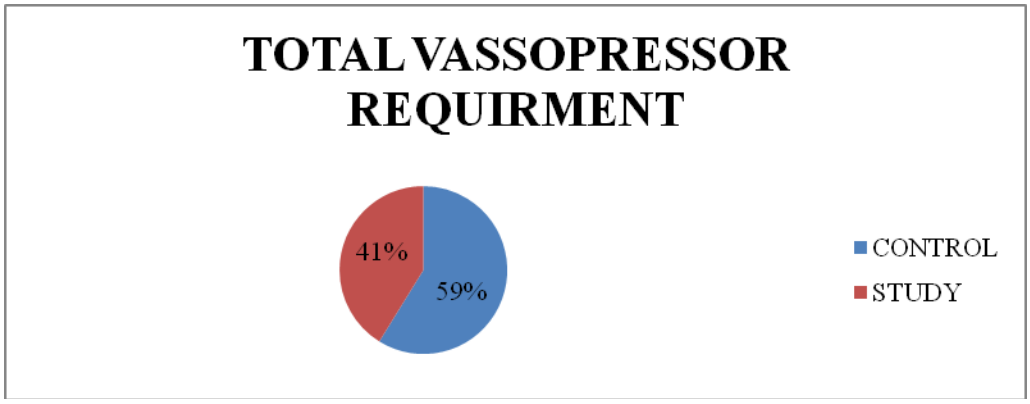
There was no statistically significant difference in the average systolic and mean blood pressure between the two groups.

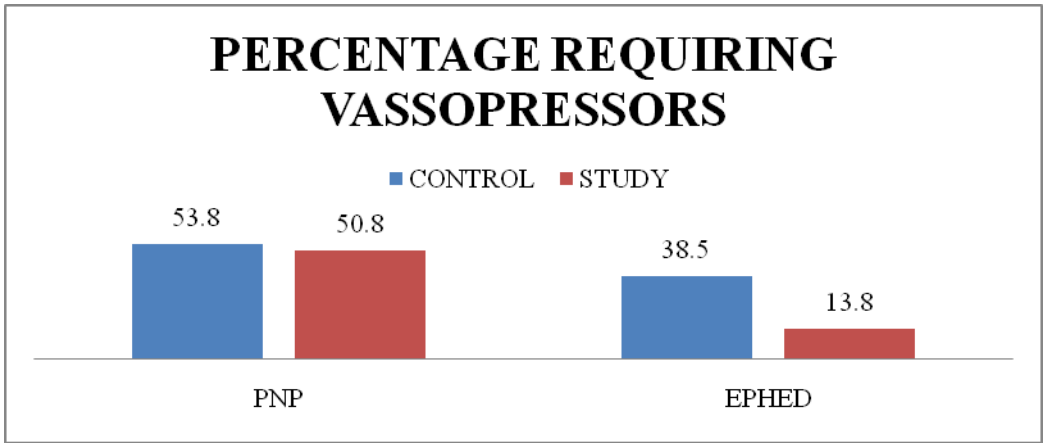

AVERAGE HEART RATE
BEATS PER MIN
92
90
88
86
84
82
80
78
76
74
72
HR 0
HR3
HR6
HR9
HR15
HR20
HR30
HR40
HR50
HR60
HR75
HR90
HR105
HR120
HR135
HR150
CONTROL
STUDY

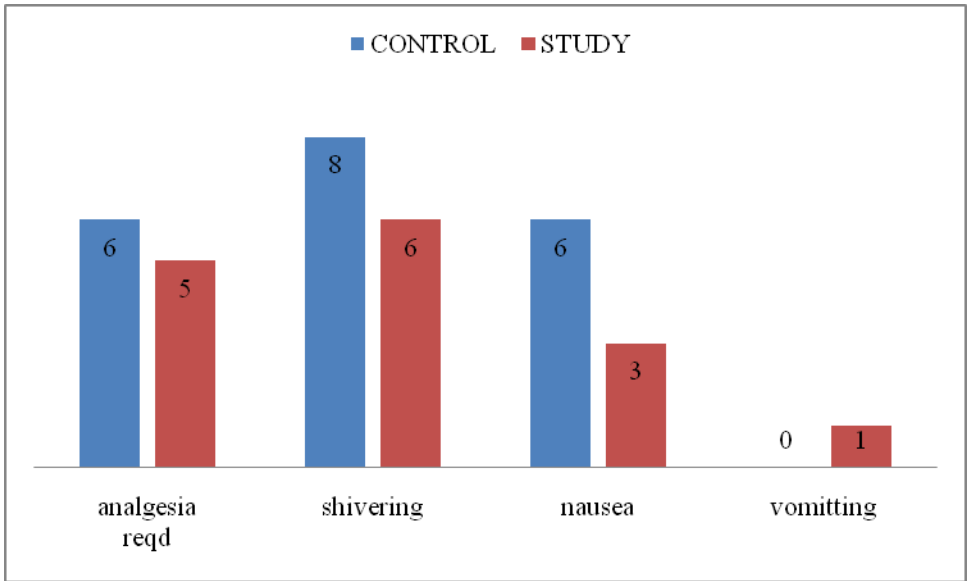
AVERAGE HEART RATE IN BOTH THE GROUPS

TIME IN MINS	CONTROL GROUP HEART RATE	STUDY GROUP HEART RATE	p VALUE
0	83.65 ±13.75	85.95 ± 13.45	0.33
3	81.86 ± 13.74	83.92 ± 12.69	0.37
9	80.8 ± 12.90	82.5 ± 113.74	0.45
15	80.26 ± 15.7	82.05 ± 12.9	0.48
20	83.05 ± 12.08	80.75 ±16.51	0.36
30	81.97 ± 12.89	81.75 ± 12.9	0.925
40	80.89 ± 12.39	81.23 ± 12.68	0.878
50	80.03 ± 12.34	80.62 ± 15.56	0.813
60	78.37 ± 13.47	81.45 ± 11.81	0.169
75	83.77 ± 28.34	81.16 ± 11.66	0.498
90	79.7 ± 10.5	81.08 ± 11.95	0.515
105	81 ± 11.23	80.35 ± 11.11	0.773
120	80 ± 12.95	79.4 ± 16.7	0.875
135	83.3 ± 13.59	81.9 ± 12.2	0.732
150	89.67 ± 13.5	85.23 ±15.40	0.553

There was no statistical difference in the heart rate between the two groups.


TOTAL VASSOPRESSOR REQUIRMENT
41%
59%
CONTROL
STUDY


PERCENTAGE REQUIRING VASSOPRESSORS
CONTROL
STUDY
53.8
50.8
38.5
13.8
PNP
EPHED


CONTROL
STUDY
6
5
8
6
6
3
0
1
analgesia reqd
shivering
nausea
vomitting

	CONTROL	STUDY	p value
PHENYLEPHRINE (in no.)	**35**	**33**	**1.00**
EPHEDRINE (in no.)	**25**	**9**	**0.17***

IN no. and %	CONTROL	STUDY	pVALUE
ANALGESIA REQD.	**6 (9.2%)**	**5 (7.7%)**	**0.754**
SHIVERING	**8 (12.3%)**	**6 (9.2%)**	**0.57**
NAUSEA	**6 (9.2%)**	**3 (4.6%)**	**0.303**
VOMITTING	**0**	**1 (1.5%)**	**0.319**

The requirement for ephedrine was significantly less in the study group with a p value of <0.05. The supplemental analgesic requirement did not differ much between the two groups, the incidence of shivering, nausea, vomiting was similar in both groups.

DISCUSSION

The incidence of systemic illnesses like diabetes mellitus, hypertension is on the rise probably because of early detection or lifestyle changes, whatever the reason, the anaesthetists role is to preserve organ function when these patients come for surgery. This is easier said than done.

An eternal debate is whether general or regional anaesthesia is better for these subset of patients, arguably most studies have not shown a clear margin of benefit between general and regional anaesthesia. Regional anaesthesia however is said to have certain beneficial effects. In an overview of randomized trials comparing effects of general and neuraxial anaesthesia on postoperative morbidity and mortality by Rogers A et al [47], neuraxial blockade reduced the odds of deep vein thrombosis by 44%, pulmonary embolism by 55%, transfusion requirements by 50%, pneumonia by 39%, and respiratory depression by 59% (all $P<0.001$). There were also reductions in myocardial infarction and renal failure. Post operative cognitive dysfunction is common in the elderly and can be associated with increased risk for postoperative morbidity and mortality, general anaesthesia was found to be associated with increased risk for early (3 days) post operative cognitive dysfunction [48] although incidence of long term post operative cognitive dysfunction did not differ in patients receiving either general or regional anaesthesia. [49]

Non healing foot ulcer and gangrene were the commonest diagnosis for which surgery was undertaken. Surgery for the for these conditions, is a relatively minor operation with negligible blood loss, but providing anesthesia for these patients is a frequent challenge because of serious comorbidities.

Cardiovascular autonomic neuropathy is associated with increased morbidity and mortality [50], and hemodynamic instability is common in patients with autonomic dysfunction during anesthesia induction and maintenance [51,52]. It is important to maintain anesthesia as stable as

possible including adequate analgesia. Although there is no clear evidence that one type of anesthetic is superior for patients with coexisting medical illnesses, the stress response to surgery may be reduced with combinations of local or regional anesthesia and the administration of opioids [53].

Regional anesthesia is a reasonable choice for lower extremity operations in most patients mainly diabetics [54]. When spinal anesthesia is planned, high sensory block levels are not required, especially when a tourniquet is not used. Limiting the block to lower dermatomal levels and avoiding the occurrence of hypotension is important because fluid loading and vasopressor administration may not be ideal methods to prevent or treat hypotension since end-stage renal disease and coronary artery occlusive disease are common in these patients. It has been suggested that when compared with the general population, patients with preexisting sensorimotor neuropathy or diabetic polyneuropathy may be at increased risk of further neurologic sequelae after neuraxial anesthesia or analgesia [55,56] Diabetic nerve fibers may be more susceptible to the toxic effects of local anesthetics [56]. Minimizing the concentration of local anesthetics can be safe for patients undergoing diabetic foot surgery.

In our study, the primary aim was to find out which concentration and baricity of local anaesthetic provided better hemodynamic stability, the hypotension with isobaric spinal anaesthesia was marginally lesser than that seen in the control group, though the p value was not significant.

This is in keeping with the finding of Malinovsky et al [23] who studied 90patients to determine the effects of volume and baricity of bupivacaine on hemodynamics, they also found no difference in the block onset and maximum cephalad spread, although the offset of anaesthesia was longer with isobaric bupivacaine which is similar to the findings in our study, where the mean duration

of anaesthesia was longer in isobaric group with a p value of <0.05. Solakovic [57], however found a greater drop in blood pressure and heart rate in patients receiving hyperbaric bupivacaine as compared to isobaric bupivacaine.

Hypotension, defined by a drop in systolic blood pressure by more than 20% from baseline, was treated with vasopressors, phenylephrine was given in doses of 50 mcg in most cases, and ephedrine in boluses of 5 mg was used when the heart rate was lower than 70bpm. The consumption of phenylephrine was no different between the two groups but that of ephedrine was significantly lesser with a p value of 0.017 in the isobaric bupivacaine probably serving as indirect indicator of increased slowing of heart rate in the hyperbaric bupivacaine, although actual comparison of heart rate at various time points did not show any significant difference between the two groups. Our study showed that both groups had stable hemodynamics, hence 0.25% isobaric bupivacaine can safely be used in patients with decreased cardiac reserve.

The time for onset of maximal cephalad block was similar in both the groups. Both groups had equally effective sensory and motor blockade. The distribution of block height was similar in both groups with an average block height of around T8, this is more than necessary for lower limb surgery and probably contributed to the hypotension [58]. The incidence of side effects like nausea, vomiting, shivering, urinary retention, post dural puncture headache was not different between the two groups. Requirement for additional analgesia was similar between the two groups. In effect isobaric bupivacaine renders spinal anaesthesia similar to hyperbaric bupivacaine albeit with a longer duration, which can be utilized as an advantage. The limitation in this study is the need for a larger sample size.

CONCLUSION

CONCLUSION

The spread of local anaesthetic is dependent upon the mass of local anaesthetic and not on its concentration as evidenced by similar time for onset, height of block and intensity of sensory and motor block, which was adequate in both the groups; however the duration of block was significantly longer in the isobaric group. 0.25% isobaric bupivacaine is as effective as 0.5% bupivacaine in providing stable hemodynamics and hence can safely be used in patients with decreased cardiac reserve.

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APPENDIX

PROFORMA FOR 0.25%/ 0.5% BUPIVACAINE STUDY FOR SPINAL ANAESTHESIA

NAME: SERIAL NO.:

AGE: DATE:

SEX: SURGERY UNIT:

WEIGHT: WARD:

ASA GRADE: II/III

GROUP: 1 2 {1= 1.5ml of 0.5% spinal bupivacaine

2= 3ml of 0.25% spinal bupivacaine}

Diagnosis:

Co-morbid illness with duration:

Pre-op: PR- BP-

Time of giving spinal:

Time of onset of block:

Level of spinal block:

Intra-op: nausea – Y/N vomiting – Y/N

Analgesia: adequate/ inadequate

Post- op: duration of analgesia:

Nausea-Y/N Vomiting – Y/N

Mins	Dermatome	Bromage Scale	SBP	DBP	MBP	PR	SpO2	Drugs E5/P50
0								
1								
3								
6								
9								
12								
15								
20								
25								
30								
40								
50								
60								
75								
90								
105								
120								
135								
150								
165								
180								

Adverse effects: Y/N (plz mention which adverse effect occurred)

Inclusion: all ASA II and above, adult surgery patients for lower limb surgery, in whom spinal anaesthesia is planned

Exclusion: ASA I, any contraindication for spinal, possible sepsis

Study drug: take 1.5ml of (heavy) 0.5% Bupivacaine and add 1.5ml of sterile saline, and give entire 3ml.

Control drug: 1.5ml of (heavy) 0.5% Bupivacaine

ABSTRACT

Name of guide: Dr. Sarah Ninan, Professor and HOD, Department of Anaesthesia, CMCH, Velllore

Name of Course: M.D Anaesthesiology

Aims and Objectives:

To compare the efficacy of two solutions of bupivacaine, 1.5ml of 0.5% bupivacaine and 3 ml of 0.25% hyperbaric bupivacaine in providing stable hemodynamics.

To compare the time of onset, height of block, intensity of sensory and motor blockade, duration of analgesia as well as the incidence of side effects between the two groups.

Materials and methods:

After sample size estimation based on a similar previous study by Paul et al 130 ASA II and ASA III patients were randomized by a computer generated sequence into two equal groups of 65 patients each, the control group received 1.5ml of 0.5% bupivacaine while the study group received 3 ml of 0.25% hyperbaric bupivacaine.

Patient and outcome assessor were blinded making it a double blinded study.

Results:

Both the groups provided good hemodynamic stability.

Onset and intensity of sensory and motor blockade was equally good in both groups with a p value of 0.12 and 0.33 respectively. The maximal cephalad spread of local anaesthetics was also similar in both groups.

The occurrence of side effects such as nausea, vomiting and urinary retention did not differ between the two groups.

However the duration of analgesia (p value 0.00) and requirement of vassopressors (control 59% and study 41%) was significantly less in the isobaric (0.25%) group.

Conclusion:

0.25% isobaric bupivacaine is as effective as 0.5% hyperbaric bupivacaine in providing stable hemodynamics in patients with decreased cardiac reserve.

KEY TO MASTER CHART

S.No. – serial number

Hosp. No. – hospital number

Gend. – Gender: male-1

Female-2

Ht/ Wt – height / weight

Grp. – group 1 – control

Group 2 – study

Diag. – diagnosis -

Diabetes-1
Hypertension – 2
Ischaemic heart disease – 3
Chronic renal failure – 4
Others – 5

Type of surgery: debridement- 1
Amputation- 2
STSG- 3
Others – 4

HR- heart rate, SBP- systolic blood pressure, DBP- diastolic blood pressure, MBP- mean blood pressure

Pre –pre operative

Brmge scale – bromage scale

Durtn of surg – duration of surgery in minutes

Sbp0 – systolic blood pressure at 0 minutes in mm of Hg then 1minute and so forth
Dbp – diastolic blood pressure, Mbp- mean blood pressure , HR – heart rate

2 seg reg– 2 segment regression -time for anaesthesia level to decrease by segments. [ex.- from T6 to T8]

Durtn of analg- Duration of analgesia - how long the spinal anaesthesia lasts in minutes

Vassppressor- drug used to increase the blood pressure- number of times required throughout the surgery. PNP- phenylephrine, eph- ephedrine

Analg reqd- analgesia required: required – 1
Not required – 2

Shivering, nausea, vomiting, other side effects: present – 1
Not present - 2

S.No	Hosp. No.	age in yrs	Gend	Ht	Wt	asa grade	Grp	Diag	type of surg	pre hr	presbp	predbp	onset of block mins	dermatome level	Brmge scale	durtn of surg in mins	sbp0	dbp0	mbp0	hr0	sbp1	dbp1	mbp1	hr1	sbp3	dbp3	mbp3	hr3	sbp6	dbp6	mbp6	hr6	sbp9	dbp9	mbp9	hr9	sbp12	dbp12	mbp12	hr12	sbp15	dbp15	mbp15	hr15	sbp20	dbp20	mbp20	hr20	sbp25	dbp25
1	640693d	49	2	155	65	2	2	1	3	86	140	80	1	T9	3	100	144	86	98	83	139	8	98	82	120	70	81	84	121	74	85	89	114	78	87	85	116	70	81	80	124	70	83	92	105	68	76	84	112	75
3	702042c	49	1	160	67	2	2	1	1	83	130	70	1	T6	3	60	133	82	93	83	130	68	89	85	122	64	78	86	116	76	86	87	10	63	74	87	102	60	70	89	106	64	74	90	107	58	69	91	106	59
4	704371d	61	2	152	50	2	2	1	1	120	110	80	3	T6	3	30	110	63	74	128	102	60	70	129	106	64	74	110	104	57	69	116	101	58	67	115	103	71	71	114	96	54	63	113	99	49	62	111	96	61
9	704372d	64	2	150	50	2	2	1	1	100	100	70	2	T6	3	30	104	57	69	112	91	58	66	114	96	54	63	101	99	62	70	88	78	50	56	93	89	55	63	82	97	56	66	89	99	64	72	93	92	57
10	475194d	53	1	159	95	2	2	2	4	68	130	80	5	T7	3	100	134	66	84	66	124	79	90	65	121	72	83	69	105	57	68	68	107	64	75	70	110	61	73	71	90	60	72	69	92	61	71	68	102	62
11	687991d	68	1	172	65	2	2	1	1,3	84	120	60	2	T6	3	80	129	81	92	88	124	72	85	87	114	67	77	83	94	62	70	81	99	62	70	80	102	60	70	82	106	64	74	83	107	58	69	90	96	54
14	684002d	42	1	166	65	3	2	1,2,5	4	70	110	90	3	T7	3	90	115	67	78	72	120	70	81	70	88	52	61	71	74	45	51	71	69	44	50	73	86	49	58	73	88	46	56	68	88	54	62	62	104	60
15	620115c	65	1	170	65	2	2	1	1	78	110	70	1	T8	3	60	121	68	87	88	118	67	85	86	121	70	88	86	121	70	87	82	102	62	77	82	91	59	73	86	96	61	75	84	87	59	71	90	90	60
16	514234D	56	1	161	55	3	2	2	2	88	160	90	2	T9	3	30	175	78	101	83	168	78	100	89	158	77	97	87	152	72	93	87	146	76	94	86	144	71	88	85	130	71	85	84	130	68	83	87	134	66
18	489279D	51	2	165	85	3	2	1,2	4	68	140	90	1	T6	3	45	144	86	98	80	139	85	98	90	115	67	78	88	120	70	81	80	114	78	87	82	111	70	80	79	115	68	78	76	113	71	81	84	107	68
22	187676c	72	2	170	65	2	2	1,3	2	85	140	80	1	T8	3	30	175	78	101	80	168	78	100	80	158	77	97	84	152	72	93	81	146	76	94	70	144	71	85	72	130	68	83	68	134	66	84	68	135	72
24	411111C	53	1	168	60	2	2	2	2	68	140	90	1	T6	3	60	144	86	98	72	139	85	98	62	120	70	81	60	93	56	6	54	86	49	58	58	87	58	66	62	82	56	62	63	92	62	69	52	90	64
25	464576d	82	2	145	40	2	2	2	1	84	131	56	5	T12	3	120	131	56	81	84	123	35	64	82	120	47	71	79	113	43	66	85	122	57	78	96	111	43	65	91	110	40	63	95	118	52	74	91	118	45
29	608064D	48	2	155	53	2	2	1,2	2	96	120	80	1	T6	3	150	163	84	107	115	152	77	100	117	124	86	66	118	135	78	83	117	129	68	83	115	138	75	88	111	146	77	94	104	129	65	85	100	130	65
36	762265D	72	1	160	60	2	2	1	2	88	134	74	3	T8	3	100	133	74	89	88	132	74	88	85	142	76	92	86	123	81	91	88	122	63	78	86	118	65	78	81	123	65	79	77	114	68	78	77	107	62
37	719144D	45	2	168	60	3	2	1	1	103	120	70	4	T10	3	90	124	72	84	104	129	80	81	105	121	77	87	103	121	72	83	102	119	71	82	100	110	61	73	98	109	64	75	99	105	57	68	98	107	64
41	191417D	47	1	175	60	2	2	1	1	64	145	96	3	T9	3	50	148	91	106	80	120	86	95	82	118	85	93	84	113	64	74	82	101	50	62	82	115	60	72	76	120	70	80	89	99	62	70	84	96	54
42	649060C	29	2	155	60	3	2	5	3	72	130	90	4	T10	3	30	135	72	87	76	124	72	84	77	129	80	81	75	121	77	87	76	124	79	89	73	121	72	83	77	120	71	82	70	116	67	79	73	115	67
44	712554D	76	1	170	75	2	2	1	1	72	160	90	4	T10	3	50	150	80	96	100	130	71	85	93	130	68	83	82	134	66	84	82	128	80	81	85	121	68	81	87	121	74	85	80	116	70	80	81	115	78
46	715035D	69	1	150	70	3	2	1	1	84	165	76	3	T10	3	90	148	91	106	80	142	75	91	82	128	76	88	83	129	75	89	84	126	71	85	85	124	73	84	85	116	76	86	81	115	70	80	83	115	60
47	006204B	69	1	155	55	3	2	1	2	82	140	80	5	T9	3	100	145	70	88	86	140	72	86	83	130	71	85	80	134	66	84	81	125	86	91	86	126	70	82	83	123	75	85	84	110	60	72	85	112	70
48	578923D	32	1	165	85	2	2	4	4	68	140	90	3	T5	3	60	133	89	99	72	133	82	93	70	113	64	74	73	101	50	64	75	95	61	69	59	91	66	68	60	93	56	65	64	98	53	68	71	91	62
52	9184115C	53	1	155	65	2	2	1	3	68	130	70	1	T8	3	75	127	68	84	70	127	61	73	62	95	69	75	60	86	57	61	58	90	64	70	52	95	61	68	77	97	63	70	81	93	60	66	76	104	68
53	640693D	49	2	165	50	2	2	1,2	4	92	120	70	2	T6	3	120	111	61	74	88	111	67	78	85	103	49	60	82	95	52	60	86	92	62	69	87	103	55	65	83	84	45	55	88	92	48	58	73	90	50
54	921044	39	2	160	60	2	2	2	4	82	150	90	3	T7	3	90	151	82	97	81	141	84	97	80	109	64	7	87	10	57	68	73	107	64	75	68	114	66	78	78	114	67	79	75	116	67	79	83	109	58
61	675629A	54	1	155	56	2	2	2	4	64	120	90	1	T7	3	90	116	60	74	98	112	64	76	66	106	65	74	67	83	48	56	68	94	66	71	69	97	55	65	67	91	58	66	63	105	57	68	60	116	60
63	652850D	41	2	155	60	2	2	1	4	78	110	80	1	T6	3	30	137	70	87	78	130	68	84	77	122	64	78	76	91	45	57	73	105	68	77	72	112	56	71	70	100	51	63	80	114	58	73	83	110	63
66	642990D	63	1	178	81	2	2	2	4	62	150	80	2	T10	3	60	121	94	85	62	116	70	80	63	105	68	76	65	96	62	70	68	113	71	81	71	111	70	80	74	135	79	92	72	88	46	56	79	124	72
67	298213C	62	1	156	64	2	2	1,4	4	86	150	90	1	T5	3	75	169	97	115	86	165	105	119	84	126	80	91	82	123	75	86	79	87	58	66	88	82	56	62	91	83	59	65	89	95	69	75	85	99	73
69	399634D	49	2	160	55	2	2	1,2,4	1	78	150	96	2	T9	3	120	124	74	84	81	127	64	78	89	99	64	72	84	86	48	57	83	97	56	66	86	89	55	63	87	104	66	75	85	92	57	65	78	98	55
73	625134D	59	2	168	49	3	2	1,4	1	70	150	100	2	T9	3	45	151	82	97	77	141	84	97	67	109	64	75	75	110	61	73	73	107	64	75	85	114	67	79	69	98	56	67	61	111	51	64	54	111	47
75	713519D	62	1	170	75	2	2	1	2	92	172	95	4	T10	3	70	160	90	107	93	154	91	106	91	167	95	110	90	143	80	94	81	136	79	90	83	124	72	85	85	114	73	82	85	115	76	86	80	124	73
77	620545	62	1	165	65	2	2	2	1	95	160	80	3	T10	3	120	148	91	106	97	142	75	91	92	143	87	99	90	128	76	88	84	113	64	74	83	101	49	62	80	99	50	62	70	115	60	73	89	106	63
78	700819D	61	2	145	60	3	2	1,2	2	89	140	85	3	T10	3	90	144	86	98	90	139	86	98	91	120	68	80	93	116	70	80	93	121	74	85	90	103	71	79	90	94	62	71	91	100	63	71	92	96	54
79	206006C	77	1	170	50	3	2	2,3	2	65	170	56	3	T8	3	85	175	78	100	68	168	78	100	66	158	77	97	64	152	72	93	58	124	73	85	62	120	76	86	63	121	72	83	65	118	70	86	65	104	56
81		55	1	170	60	2	2	1	1	68	125	65	4	T9	3	65	125	65	81	70	124	66	83	69	127	64	78	70	126	65	80	68	120	65	79	71	119	63	77	70	121	53	70	67	114	63	76	66	117	61
82	690663D	53	1	160	75	2	2	1,2	4	90	120	70	2	T10	3	120	118	85	93	96	113	64	74	93	101	49	62	99	99	50	62	80	102	60	70	72	101	63	72	75	103	60	72	76	101	60	70	76	105	60
84	736735D	53	1	165	65	3	2	1	2	74	130	90	4	T8	3	100	127	68	84	73	127	61	73	72	98	55	66	76	109	67	77	77	92	60	66	79	107	70	78	74	103	64	73	78	86	48	57	80	89	56
85	701548D	50	2	160	70	2	2	1,2	4	92	140	80	3	T6	3	60	143	80	94	96	137	81	94	98	136	79	90	99	124	72	85	103	114	67	77	96	94	62	70	97	99	62	70	95	93	56	65	98	96	62
86	992368C	58	1	168	60	2	2	2	4	70	110	70	2	T8	3	80	110	67	85	76	108	64	83	76	102	60	78	74	91	59	73	75	96	61	75	77	87	60	72	76	90	60	72	78	102	62	77	82	100	65
88	727335D	61	1	168	60	3	2	2	1,3	88	130	70	3	T8	3	45	125	65	81	88	124	69	83	88	127	64	78	88	126	66	0	81	120	65	79	81	119	63	77	79	121	53	70	75	126	57	72	76	114	63
89	713547D	67	1	170	80	2	2	2	4	62	130	90	1	T6	3	90	136	80	90	66	130	81	92	68	124	72	85	68	115	70	79	63	99	63	71	60	94	73	76	63	95	62	70	67	93	52	63	67	100	51
91	686057D	59	1	154	60	2	2	1	3	78	130	80	2	T7	3	30	117	71	82	83	116	76	86	87	110	63	74	81	106	64	74	82	107	58	69	83	104	67	79	85	106	60	72	79	103	62	72	80	101	60
96	599746D	52	2	155	45	2	2	1	2	82	130	96	2	T8	3	105	137	70	87	83	130	68	84	80	133	73	88	92	122	64	78	90	114	58	73	84	102	53	66	86	101	50	63	74	104	68	77	70	112	56
97	128474C	56	1	156	75	2	2	1	2	76	140	90	1	T7	3	60	144	86	98	76	139	85	98	77	115	67	78	74	120	70	81	78	93	56	65	78	74	45	51	73	88	52	61	86	78	49	56	88	86	49
98	608064D	48	2	158	50	2	2	1,2	1	102	160	100	1	T5	3	40	165	105	119	103	169	97	115	107	168	78	100	103	158	77	97	104	146	76	94	108	144	71	88	105	130	71	85	103	158	77	97	104	134	66
100	612617D	44	1	158	50	2	2	1	1	100	130	90	1	T10	3	30	124	72	84	101	129	80	81	103	121	77	87	98	124	79	90	100	119	71	82	99	107	64	75	97	90	59	67	102	101	65	79	105	104	77
102	608064D	48	2	158	50	2	2	1,2	2	88	150	90	2	T8	3	40	158	77	97	83	152	72	93	87	146	76	94	86	144	71	88	79	130	71	85	78	130	68	83	77	34	66	84	81	135	72	87	76	141	84
104	660741D	66	1	157	54	2	2	1	2	108	154	79	1	T6	3	60	141	71	92	105	156	73	94	104	141	77	92	104	152	68	88	106	152	79	97	102	148	72	91	102	147	73	92	105	153	75	93	100	153	74
105	713011D	39	2	150	55	2	2	1	1	99	101	68	5	T12	3	30	121	68	75	98	98	72	50	84	101	49	68	84	88	54	52	80	95	49	62	98	93	50	59	79	91	51	57	76	102	57	67	79	2	58
106	595239D	62	1	160	40	3	2	1,5	2	86	140	80	2	T8	3	75	120	70	78	80	120	72	79	82	130	65	76	84	130	64	75	82	130	62	74	80	128	72	78	82	120	80	80	83	120	72	68	3	120	70
109	780352D	59	1	170	70	3	2	1	2	113	140	90	3	T8	3	75	130	87	97	110	137	84	95	110	137	86	95	110	155	94	102	112	154	89	109	108	146	91	104	109	154	89	105	108	146	91	104	109	146	90
112	567039D	69	1	167	50	2	2	1	1,3	110	120	64	3	T6	3	75	120	64	77	120	106	54	70	110	97	60	57	114	94	60	54	110	97	62	55	112	90	62	48	115	97	64	54	116	90	54	54	116	70	45
113	720104D	44	1	170	60	2	2	1	2	90	110	70	3	T8	3	130	110	67	77	89	116	70	80	80	114	78	87	81	111	72	81	70	113	71	81	76	112	75	84	76	104	0	74	82	105	70	79	86	107	67
117	647425C	49	1	165	50	2	2	1	2	82	124	70	1	T9	3	120	124	70	83	83	121	68	87	81	115	65	83	80	103	60	75	87	91	60	73	83	96	60	75	84	97	69	81	88	105	68	83	85	110	77
118	663506C	62	1	155	50	2	2	1	2	78	130	90	5	T8	3	90	126	80	91	80	123	75	86	82	95	69	75	72	92	62	79	70	99	3	79	64	90	64	70	64	95	61	68	66	97	63	70	60	93	64
119	720104D	44	1	170	60	2	2	1	4	78	110	80	2	T10	3	30	120	70	81	86	115	67	78	82	121	74	85	82	114	78	87	84	111	70	80	85	115	68	78	86	113	71	81	89	96	62	70	82	112	75
121	780352D	50	1	160	60	2	2	1	2	69	120	80	2	T8	3	50	118	67	79	70	117	68	81	71	98	65	73	76	109	67	77	78	107	70	75	72	97	65	71	70	103	58	68	78	103	55	65	75	106	54
122	795338D	39	1	155	65	2	2	2	1	73	110	90	2	T8	3	60	115	80	89	77	110	67	85	75	108	64	83	78	102	60	78	77	106	62	77	71	91	60	73	73	96	57	71	74	90	60	72	77	103	70
123	713988D	50	1	165	75	2	2	1	1	90	130	70	2	T9	3	60	130	68	84	93	137	70	87	99	133	73	88	95	122	64	78	99	110	63	76	93	115	58	74	100	102	53	66	92	101	50	63	90	91	50
124	795394D	65	1	166	45	2	2	1	2	77	110	70	1	T9	3	20	108	58	70	79	100	50	62	79	92	50	60	74	100	52	63	71	92	53	61	77	92	60	67	70	103	50	60	73	95	52	59	72	95	60
125	214427	50	1	165	65	3	2	1	2	67	140	70	1	T7	3	70	141	84	94	70	110	65	75	68	107	64	73	67	110	69	78	66	102	61	70	65	98	60	70	66	93	58	61	63	101	58	68	61	103	60
126	725037D	46	1	165	60	3	2	1	1	83	120	70	3	T8	3	50	125	80	91	85	121	73	84	87	119	70	81	86	124	76	85	78	119	72	83	79	108	56	67	81	115	62	73	83	110	61	74	83	110	57
127	724072D	65	1	160	65	2	2	1,2	2	92	130	90	2	T9	3	45	120	60	78	91	118	60	800	88	115	61	72	91	110	61	74	89	108	52	67	90	105	50	62	78	110	60	67	70	105	50	61	88	102	51
130	782305D	47	2	156	60	3	2	1	1	83	110	70	2	T8	3	60	110	69	78	88	102	61	70	88	98	61	69	82	93	50	61	89	101	55	68	100	101	61	71	94	104	61	71	99	102	60	69	95	98	40

mbp25	hr25	sbp30	dbp30	mbp30	hr30	sbp40	dbp40	mbp40	hr40	sbp50	dbp50	mbp50	hr50	sbp60	dbp60	mbp60	hr60	sbp75	dbp75	mbp75	hr75	sbp90	dbp90	mbp90	hr90	sbp105	dbp105	mbp105	hr105	sbp120	dbp120	mbp120	hr120	sbp135	dbp135	mbp135	hr135	sbp150	dbp150	mbp150	hr150	sbp165	dbp165	mbp165	hr165
84	80	101	66	73	87	100	65	78	86	107	68	78	85	104	68	77	83	124	72	85	83	114	67	77	87	113	71	81	82	115	68	78	80	111	70	80	79								
71	87	103	61	71	88	105	59	70	85	107	58	69	86	106	59	71	82	103	61	71	81	101	8	67	80	105	59	70	83	101	49	62	81												
75	111	87	59	71	112	105	68	83	115	106	62	81	110	102	62	77	90	104	60	64	96	106	59	71	93																				
65	96	121	53	70	88	98	55	66	99	109	67	77	90	116	77	86	91	107	69	78	93	104	66	75	94																				
77	67	102	53	66	67	91	45	57	60	104	68	77	62	112	56	71	63	100	51	63	63	110	63	76	62	101	65	79	69																
63	76	99	62	70	77	91	58	66	76	96	54	63	79	109	67	77	79	92	57	65	81	119	87	94	83	125	84	94	83	114	63	76	83												
74	64	105	70	79	73	117	67	75	76	95	61	69	76	101	66	73	79	128	80	90	81	132	93	102	73	136	79	90	72	137	81	94	70	127	68	81	71								
72	92	105	68	83	100	112	68	87	90	114	58	73	85	102	53	65	85	122	64	78	83	112	56	71	84	110	61	73	84																
84	90	135	72	87	80	54	77	96	81	141	84	97	83	124	76	86	85	129	80	89	82	135	79	92	83	132	93	102	84																
78	88	101	65	79	90	104	68	77	91	116	78	86	87	117	70	82	86	114	59	72	85	114	59	72	85	129	77	90	85	126	71	85	87	134	72	88	89	143	87	99	83				
87	63	124	72	84	64	121	77	82	60	124	79	90	61	121	72	83	59	134	72	88	62	120	65	78	64	129	72	86	68	127	65	81	70	121	68	81	66	126	7	86	67				
70	64	84	57	63	66	104	60	74	60	95	69	75	62	99	73	79	61	93	64	71	61	105	70	79	68	107	67	75	70	114	67	77	68	114	73	82	69	111	70	80	69				
69	90	115	49	71	84	106	48	67	82	97	54	68	83	83	66	71	84	98	53	68	89	87	55	65	90	108	76	86	72	106	56	72	74	106	60	75	75	110	52	71	80	108	62	77	84
86	96	120	64	77	96	114	65	70	97	111	64	68	96	114	66	70	96	124	72	76	95	120	67	75	99	124	74	74	101	127	69	81	106	121	71	73	99	126	71	79	108				
73	80	107	62	73	77	100	62	71	78	94	63	70	81	102	62	73	79	100	64	71	79	100	56	68	74	105	57	68	75	107	64	75	75	109	64	75	70								
75	99	114	66	78	98	117	61	74	97	121	53	70	98	116	78	88	99	103	64	73	100	119	87	94	98	119	63	77	97	120	65	79	100	124	69	83	100	127	65	81	99				
63	88	91	60	66	70	110	63	74	65	102	60	70	68	117	60	70	75	106	60	70	81	104	57	69	85	116	75	83	81																
78	72	114	66	78	76	110	61	73	79	121	68	87	76	124	72	85	77	128	80	90	77	132	93	102	75																				
86	83	110	70	80	82	115	65	76	84	110	75	84	79	110	60	70	78	105	65	73	77	107	67	75	77	115	67	78	78	114	73	82	80												
72	87	114	60	72	88	110	61	69	89	106	54	65	79	120	72	83	82	115	60	72	83	121	70	85	87	123	75	86	87	125	75	88	86	124	70	83	87								
70	87	101	60	68	87	106	60	71	89	105	60	70	81	110	63	75	80	112	62	71	78	107	60	70	79	116	76	86	87	113	65	75	86												
73	72	97	59	73	71	92	60	72	70	102	72	83	70	105	60	79	69	108	65	84	75	110	78	89	77	115	76	85	76	109	63	79	71	110	67	77	70								
77	88	94	63	70	67	100	65	78	61	105	64	75	66	110	60	70	65	112	70	79	67	112	60	73	63	106	64	75	65																
59	64	104	56	67	77	109	58	69	78	105	50	63	85	104	66	7	82	99	64	72	83	103	64	73	86	125	84	94	87	109	67	77	80	110	70	79	83								
69	74	104	56	67	75	105	50	63	77	103	49	60	86	117	74	81	87	126	81	87	87	116	67	79	85	124	79	90	78	119	71	82	85												
74	61	108	59	70	65	113	68	79	63	119	69	81	61	123	69	82	66	121	70	88	65	121	71	87	64	121	68	86	63	122	78	95	61												
76	79	114	67	97	84	115	70	80	85	113	71	81	82	128	80	90	85	107	67	75	83	124	72	85	77	114	73	82	75	115	67	78	73	105	68	76	76	113	71	81	72	128	80	90	71
85	77	115	68	78	78	126	75	86	66	113	71	81	61	95	61	69	67	160	90	107	69	114	67	77	75	132	93	102	78	101	66	73	81	128	80	90	82	129	81	92	77	124	72	85	79
79	82	97	63	70	83	94	63	70	78	104	68	77	77	107	68	78	87	100	65	78	88	101	65	79	89	104	68	77	75	114	77	85	92	104	56	67	91	109	58	69	88	112	59	71	82
66	86	103	64	73	83	107	76	79	84	106	65	78	84	101	65	80	83	94	63	70	67	104	68	77	76	103	58	68	72	103	60	68	85												
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85	82	123	68	81	87	121	64	76	89	116	60	71	80	120	67	79	81	103	65	74	79	120	85	93	78	125	85	94	81																
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65	63	105	52	67	66	96	54	63	67	102	60	70	69	106	64	74	68	107	58	69	67	104	60	70	67	105	60	72	63	103	67	75	64	114	60	73	64								
74	65	109	67	77	65	104	66	75	60	99	64	72	61	97	56	67	61	103	65	74	63	107	68	79	62	105	70	79	65	109	65	76	63												
70	73	99	62	70	70	96	54	63	68	91	60	67	73	105	70	84	76	112	68	88	77	110	67	85	77	106	65	81	79	115	65	75	83												
64	76	97	56	66	79	99	65	73	81	95	60	67	83	116	77	86	74	117	60	75	70	121	63	76	73	126	66	80	73	120	65	80	77	124	70	83	75								
70	96	100	67	74	93	114	67	76	94	95	67	72	94	101	67	73	97	115	70	79	98	124	70	79	98	126	68	82	92	119	65	78	96	117	62	75	97								
78	83	96	53	63	85	104	56	67	86	106	54	65	86	112	60	71	79	113	60	65	77	106	58	70	78	108	67	72	73	103	64	78	72												
72	88	115	60	71	76	109	57	69	73	116	77	86	82	103	64	73	84	120	82	93	85	115	80	86	80	107	70	77	83	115	67	78	82												
63	51	97	52	62	53	102	54	61	53	102	65	74	56	107	65	75	62	114	60	73	64	109	67	77	65	103	65	74	63	112	56	70	62	114	60	73	63								
68	78	105	60	70	81	106	63	81	83	108	64	85	86	110	70	86	87	113	72	87	81																								
71	87	100	51	63	72	105	50	63	75	94	62	70	87	99	62	70	80	114	73	82	80	114	67	77	82	111	70	80	81	113	71	81	81	110	67	77	85								
58	77	88	54	62	87	104	60	74	81	105	0	79	7	95	61	69	75	111	70	80	78	99	62	70	78	100	51	63	71	114	58	73	71												
84	107	130	67	83	106	135	72	87	107	129	80	81	107	121	74	86	103	124	79	90	105	124	73	85	108																				
85	100	104	68	77	106	119	87	94	94	116	77	86	95	115	70	83	97	120	65	79	96																								
97	82	129	80	81	85	124	72	84	80	124	6	86	80	121	77	87	83																												
95	97	145	78	93	97	149	73	91	98	137	72	88	98	149	73	93	97	142	75	91	100	134	72	88	99	124	73	85	94	130	71	85	93	135	72	87	97	144	71	88	100	152	72	93	101
53	75	95	58	67	78	92	57	65	80	103	64	73	87	102	60	70	82	104	57	69	76	101	58	67	74	107	58	69	70	106	63	73	2	104	66	75	88								
66	84	120	65	65	84	120	65	65	82	120	55	64	80	110	50	64	81	110	55	73	82	100	50	66	83	100	55	63	82	100	55	63	80	105	50	1	80								
103	112	124	84	93	110	124	80	91	110	142	95	106	109	146	76	94	111	130	71	85	102	34	66	84	107	135	2	87	108																
40	110	80	45	50	120	106	54	70	100	92	57	54	115	100	64	57	114	108	69	71	116	100	61	59	114	97	62	55	112	110	62	68	108												
75	80	104	68	77	81	101	66	9	82	109	70	80	86	101	66	73	85	99	64	72	88	107	62	76	90	120	70	81	100	139	85	98	110	144	86	98	112	143	80	94	114				
89	83	108	70	85	87	107	70	80	86	106	72	85	85	112	68	87	88	121	70	87	85	126	82	89	89	130	79	81	95	140	82	97	96	130	68	83	91								
71	69	107	68	78	70	104	68	77	71	94	63	70	71	100	65	78	78	101	65	79	80	111	72	80	73	114	72	82	79	116	70	86	64	115	67	78	68								
84	79	105	68	76	80	105	70	79	81	101	60	73	82	99	62	70	82	90	64	70	78	95	61	68	80	104	68	77	90	101	67	79	88	100	65	78	80	117	71	85	79				
65	75	110	60	70	71	96	56	68	69	100	60	71	67	110	68	79	68	115	67	79	73	114	61	73	69	116	60	79	70	120	60	78	67												
83	79	102	63	78	80	116	70	84	81	120	70	88	83	124	80	85	74	128	80	92	72																								
58	94	104	68	77	90	112	56	71	97	100	51	63	92	105	59	64	95	110	68	79	97	114	77	85	90	114	73	82	90	115	69	79	92	124	72	84	93								
67	76	104	65	75	76	106	70	78	77	110	67	79	77	111	65	78	75	115	64	75	78	107	64	71	75	115	67	79	81																
72	67	104	61	71	69	102	65	73	70	115	63	75	68	107	65	73	69	106	60	71	66	112	55	70	65	110	62	75	67	115	61	73	70	109	62	77	71	120	71	83	72				
69	85	105	60	71	82	120	65	78	85	116	66	78	87	123	70	82	86	125	72	84	78	130	70	85	71	133	82	94	75																
62	76	105	60	72	73	105	59	71	85	102	60	69	89	104	61	71	91	107	68	82	92	105	63	73	93	107	61	73	93																
60	80	107	68	82	88	97	50	61	80	109	54	66	99	109	61	72	98	120	68	79	88	111	55	68	80	110	57	69	85	120	58	71	83												

sbp180	dbp180	mbp180	hr180	2 seg reg - mins	durtn of analg in mins	no of times vassopressor-pnp	no of times vasopressor-eph	analg reqd	shivrng	nausea	vomiting	other side effects
				50	135	0	0	1	2	2	2	2
				30	120	0	0	1	2	2	2	2
				25	90	2	0	1	2	2	2	2
				20	90	7	0	1	2	2	2	2
				25	105	3	0	1	2	2	2	2
				40	120	1	1	1	2	2	2	2
				40	135	6	0	1	2	2	2	2
				25	105	0	4	1	1	1	2	2
				30	105	0	0	1	2	2	2	2
				30	150	0	0	1	2	1	1	2
				30	150	0	0	1	2	2	2	2
				40	150	4	0	1	2	1	2	2
110	66	80	86	40	180	2	0	1	2	2	2	2
				30	120	0	0	2	2	2	2	2
				30	135	0	0	1	2	2	2	2
				30	150	0	0	1	2	2	2	2
				30	90	2	0	1	2	2	2	2
				40	75	0	0	1	2	2	2	2
				30	105	0	0	1	1	2	2	2
				30	135	0	0	1	2	2	2	2
				30	120	0	0	1	2	2	2	2
				30	120	3	0	1	2	2	2	2
				25	105	1	2	1	2	2	2	2
				30	120	4	0	1	2	2	2	2
				40	120	1	0	1	2	2	2	2
				25	120	3	0	1	2	2	2	2
				30	180	3	0	1	2	2	2	2
114	67	97	80	30	180	1	0	1	2	2	2	2
117	74	81	84	30	180	0	3	1	2	2	2	2
				30	120	4	1	1	2	2	2	2
				25	105	6	0	1	1	2	2	2
				25	105	0	0	1	2	2	2	2
				25	135	5	0	2	2	2	2	2
				30	120	0	0	1	2	2	2	2
				30	135	3	0	1	2	2	2	2
				25	120	0	0	1	2	2	2	2
				30	120	4	0	2	2	2	2	2
				40	135	4	0	1	2	2	2	2
				30	120	0	0	1	1	2	2	2
				30	120	2	0	1	2	2	2	2
				40	120	0	0	1	2	2	2	2
				30	120	4	0	1	2	2	2	2
				20	60	0	0	1	2	2	2	2
				30	135	4	0	1	1	2	2	2
				30	120	2	4	1	2	2	2	2
				25	90	0	0	1	2	2	2	2
				20	75	0	0	1	1	2	2	2
				25	60	0	0	1	2	2	2	2
158	77	97	100	60	180	0	0	1	2	2	2	2
				30	90	5	2	1	2	2	2	2
				40	135	5	0	1	2	2	2	2
				30	105	0	0	1	2	2	2	2
				30	120	3	5	1	2	2	2	2
				40	105	0	0	2	2	2	2	2
				25	90	0	0	2	2	2	2	2
				40	135	1	0	1	2	2	2	2
				30	120	0	0	1	2	2	2	2
				30	120	0	0	1	2	2	2	2
				30	90	0	0	1	2	2	2	2
				40	120	4	0	1	2	2	2	2
				30	105	6	0	1	2	2	2	2
				40	135	1	0	1	2	2	2	2
				30	105	0	0	1	2	2	2	2
				40	90	3	0	1	2	2	2	2
				30	120	0	5	1	2	2	2	2